THE

SCIENTIFIC AND LITERARY REVIEW,

AND RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,

INCORPORATING THE

Journal of the Inventors' Institute.

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THE INVENTORS' INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE.

Chairman of the Council—**SIR ANTONIO BRADY.**

THE various efforts which have been made, and the numerous influences now at work to injure, if not to destroy, Patent Rights; the inefficiency of the many well intended, but ill considered, schemes of Patent Law Reform which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor, without advantage to the Public; together with the proceedings so essentially involving the interests of inventors which have already taken place in Parliament, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organizing the influence of Inventors, Patentees and others. Its objects are:—

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2nd. To promote improvements in the Patent Laws.

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APPLICATIONS FOR LETTERS PATENT.

*** In this list (Com.) means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur-street, Charing Cross.

On October 13th.—3313 to 3317.—B. Massey and J. Hill. Steam boilers.—J. Manwell. Charging horizontal retorts and apparatus therefor.—J. Harvey and G. Pryer. Method of adapting and employing lead and iron in the construction and ballasting of ships or vessels.—J. Foster. Signal apparatus for railways.—A. M. Clarke. Electric telegraph apparatus (com.)

On October 14th.—3318 to 3327.—J. S. Muir. Manufacture of petroleum oils and spirit and like hydrocarbons for the manufacture of gas therefrom.—J. S. Muir. Manufacture of gas.—J. Welch. Doubling frames, and for preventing roller laps and single yarn in the same.—S. Pilkington. Mules for spinning.—S. Delalot. Process for plating, coating, or covering iron direct with silver or gold.—J. E. Sherman. Improvements applicable to Bessemer convertors and blast furnaces.—J. E. Sherman. Manufacture or production of iron and of cast iron.—T. Black. Appliances for cleaning, scaling, and stopping tubes.—W. Cribb and J. Rackham. Improvements in matches.—H. J. Surmon. Apparatus for manufacturing gas.

On October 15th.—3328 to 3344.—W. C. Thomas. Railways, and the mode of transporting passengers and goods thereon.—T. A. Metcalfe and W. Massingham. Manufacture of manure.—A. M. Clarke. Improvements in pianoforte actions (com.)—J. Towle. Treating sewage.—J. L. Shorrock. Machinery for washing or cleansing clothes and other articles, applicable also to dying purposes, mixing oils, and other substances or liquids.—E. Bevan. Obtaining filaments, fibres, and pulp from flax, hemp, jute, and manilla.—T. Whitehead. Machinery for treating flax, tow, and similar fibrous substances.—W. Noble. Utilising the heat of the exhaust steam of engines, also for economising the water used therein, and the apparatus or means employed therefor.—H. Deacon. Apparatus for the manufacture of alkali.—W. Dawes. Musical instruments.—W. Walton. Wire cards.—J. C. Mewburn. Fire-escapes (com.)—E. T. Hughes. Expansion gear or cut-off motion for steam engines or other motors (com.)—G. F. Harrington. Propelling ships or vessels.—K. H. Loomis. Locking washer for securing nuts or screw bolts and for similar purposes. Complete specification.—W. R. Lake. Double-acting lift and force pumps (com.)—G. Haseltine. Rotary engines (com.) Complete specification.

On October 16th.—3345 to 3346.—J. J. Bennett. Ornamental asphalte pavement and tiles. B.

Spencer, T. Washington, and J. Oddy. Machinery for washing wood and fibres.—W. T. and E. Guilfoyle. Candles.—J. Woolley and T. Padgett. Brick-making machinery.—H. Cooke. The better utilisation of Bessemer steel rail ends through their conversion into strips and hoops. —J. Imray. Apparatus for clearing steam pipes of air and water of condensation, and for regulating the temperature of liquids heated by steam (com.)—J. S. Castle. Manufacture of butter. —J. B. Leslie. Apparatus for indicating the direction of ocean and other currents.—A. M. Clark. Manufacture of artificial fuel and in the production of gas for illuminating and heating purposes (com.)—M. Fenton and B. Cockayne. Moulds and apparatus for casting ingots and other articles of steel and other metals.—E. Serjeant. Machinery for dressing metallic hinges. J. B. Spence. Manures or fertilizers.

On October 17th.—3357 to 3370.—J. R. Napier. Fire-places for cooking food and heating air or or liquids.—W. Rutherford. Weaving bags, sacks, tabular fabrics, and similar textile articles.—L. James. Preparation of sea-weeds in order to render them applicable to ornamental purposes.—J. H. Johnson. Boilers or apparatus to be employed in effecting solution and filtration (com.)—G. H. Goodman. Machinery for breaking and crushing stones, ores, and other hard substances.—J. Unsworth. Frillings for trimming purposes by method of preparing and introducing elastic india-rubber threads into plain, tabby, twill, gauze, or net figured silks or union of silk with cotton, in width from one to twenty-four inches.—J. C. Mewburn. Steam-boiler and other furnaces (com.)—R. Pickwell. Kiln or combination of kilns.—G. Gordon de Luna Byron. Construction of ordnance and other hollow and other structures (com.)—C. H. Murray. Construction of press applicable to the manufacture of bricks, tiles, and other moulded articles.—J. Moseley and T. Holbrook. Looms for weaving.—S. Myers. Stoves, and means of and appliances for utilising the heat therefrom for warming purposes.—G. B. Galloway. Means of economising fuel, and appliances connected therewith and therefor.—J. F. Jaques. Method of generating heated air.

On October 18th.—3371 to 3389.—J. H. Johnson. Skates (com.)—A. Belt. Safety gas-burners.—J. Knight. Asphalte paving.—E. A. Roy. Construction of vessels for the conveyance of passengers at sea and other purposes.—J. H. Johnson. Code suitable for electro-telegraphic despatches (com.)—A. Brown. Apparatus for heating the blast of blast furnaces (com.)—J. H. Johnson. Apparatus for obtaining fresh water from sea water (com.)—E. A. Jones and J. A. Jones. Manufacture of iron and steel.—S. Osborn and S. Alley. Screw propellers.—T. Hyatt. Platting iron, and rendering the same fireproof, and the application of such plated iron. —T. Hyatt. Architectural and engineering constructions.—J. C. Coombe. Smelting and manufacture of pig iron.—J. Quick, junior, and J. W. Restler. Apparatus for measuring the passage of water and other liquids, also for pumping purposes.—C. V. Zenger. Treating tinned iron plates and scrap in order to recover the tin therefrom.—S. Mendel. Horse-shoes.—H. E. Ermen and G. A. Ermen. Machinery for preparing cotton and other fibrous substances.—R. Stone.—Apparatus for manufacturing artificial fuel, bricks, tiles, and other similar compressed articles.—J. W. Keobler and D. Ferguson. Machinery for cleansing sharps or middlings from impurities and preparing them for grinding.—F. Maass and A. Flos. Packing for stuffing-boxes and other purposes.

On October 20th.—3390 to 3400.—R. Birch and W. McGiffert. Liquid stove polish (com.)—R. Baird. Furnaces for steam boilers.—W. Ambler and W. Gawthorp. Beer, water, and other liquid taps and valves.—W. R. Lake. Machinery for folding, piling, measuring, and examing textile fabrics and other like materials, and apparatus connected therewith (com.)—H. Salisbury. Machinery for washing and drying straw plait.—C. H. Wood. New motive power for engines.—J. Patterson. Machinery for boring rocks and other hard substances.—G. Kelley. Machinery or apparatus for spinning wool or other fibrous substances.—C. W. Keighley and W. Netherwood. Machinery or apparatus for cutting woollen or other cord or corduroy.—H. Paddison. Balances or weighing machines.—G. Dyer. Domestic fire stoves or grates, or parts thereof.

October 21st.—3401 to 3419.—O. Trossin. A new grease to enable superheated steam to be used as a motive-power in steam engines, and the mode of applying said grease.—W. Hamilton. Steam engines, and the modes and means of feeding their boilers.—C. Askew and A. Reynolds. Apparatus for raising sunken ships and vessels.—C. Vafea and T. Vafea. Method of raising sunken ships or vessels and other submerged property, and of rendering ships or vessels buoyant, and also an apparatus to be used for the above purposes.—A. Pope. Steam engines and boilers, and apparatus connected therewith. —G. Chambers. Heels for boots and shoes.—T. Holliday, C. Holliday, and E. Holliday. Means or apparatus to facilitate the dyeing of fabrics and thread and yarns by the use of indigo and certain hydrosulphites.—T. Holliday, C. Holliday, and E. Holliday. Means or apparatus to facilitate the dyeing of wool, hair, or other fibre by the use of indigo and certain hydrosulphites.—A. S. Ayre. Means or apparatus for the compression of oil seeds, to extract oil therefrom and produce cakes, which improvements are also applicable in the compression of other seeds or matters for the production of cakes, blocks, or other forms.—D. Elkan. Umbrella tip caps.—J. S. Raworth. Machines for doubling and winding cotton, silks, and other yarns.—L. Gingembre, fils. Hooks or clasps, and the means for securing them to shoes, gaiters, and other articles.—T. H. Isherwood. Fire grates and furnaces.—A. Turner. Manufacture of elastic fabrics.—W. McNabb. Improved instrument or machine for drawing together and securing the ends of hoops or bands around bales of cotton or other merchandise.—J. Harvey. Stills.—A. Clark. Mixture for preparing farinaceous compounds for baking.—W. G. Walker. Spanner.—A. M. Clark. Apparatus and process for the manufacture of artificial fuel (com.)

On October 22nd.—3420 to 3438.—A. M. Clark. Attachment or covering for boats, for protecting the occupants from the waves, sun, and rain (com.) (Complete specification.)—W. Luck. Graphoscope.—R. W. Morris. Revolving shutters.—J. Brownjohn. Turnstiles and in registering apparatus connected therewith.—A. Heatherington. Apparatus for separating substances of different specific gravities, especially applicable to the separation of metals, ores, or precious stones from earth or other impurities. —G. P. Dodge. Manufacture of india-rubber hose.—R. W. Medlen. Obtaining from petroleum, paraffin, or coal oil an improved quality of light for preventing smoke and smell, and for economising the oil.—W. Robertson, J. G. Orchar, M. A. Muir, and J. McIlwham. Machinery for winding yarn or thread, part being applicable to other machinery requiring a varying motion.—H. Bancroft. Steam engines.—G. Temple. Piston for steam or other engines or for pumps or for steam hammers.—S. Wilkinson. Arrangement for relieving the pressure in gas retorts.—H. Poth and T. Simpson. Mode of constructing chests of drawers and similar descriptions of carcass drawer-work or other furniture.—R. S. Walker. Machinery for compressing and forming into blocks, peat, artificial fuel, and other materials.—Earl of Caithness. Transmitting motion.—W. Chadburn. Apparatus for regulating the working of engines, and for indicating the direction of revolution and speed of their driving shafts.—T. Adams. Safety valves.—S. C. Dank. Means of preserving telegraph, signal, gate, and other wood posts from dry rot and decay.—E. T. Hughes. Treating wood and vegetable fibre in general by "carburetted steam" and compression, to strengthen and preserve such matters from decay (com.)—J. Midgley. Machinery for twisting fibres (com.)

On October 23rd.—3439 to 3452.—F. W. Brown. Tuckers for sewing machines.—J. Fairbank. Manufacture of nuts or other metal tubes (com.)—L. Seegers. Construction and arrangement of apparatus for economising the consumption and increasing the illuminating and heating powers of coal gas, water gas, and other inflammable vapours and gases, and mixtures thereof. (Complete specification.) — G. Clark. Appliances for the preservation of animal and vegetable substances.—J. Bell. Machinery and apparatus for wringing and mangling.—J. Martin. Propellers for ships, vessels, or boats.—J. Robertson. Compressing air for burning in combination or mixture with the gas or inflammable vapours in apparatus for finishing textile or other fabrics, or in other apparatus where heat is required, and in the means employed therefor.—T. Dentith. Producing or preparing indigo-blue dye.—T. Briggs. Manufacture of carpets and similar woven fabrics.—A. V. Newton. Machinery for cutting and arranging playing and other cards (com.)—A. M. Clark. Machinery for printing in colours (com.)—P. Griffin. Process for purifying and ageing spirits.—T. J. Denne and M. C. Denne. Machines for soleing boots and shoes, and for sewing other garments and articles.—I. Bois, fils. Manufacturing caustic soda.

On October 24th.—3453 to 3463.—D. R. Ratcliff. Construction of locks.—F. Wirth. Smoke-consuming feeding furnace (com.)—T. A. Weston. Friction joints or bearings, specially applicable to toilet glasses and other swinging frames.—W. P. Branson. Mode of roasting coffee, cocoa, and malt, and apparatus employed therein.—W. Weems. Apparatus or means for lighting and ventilating.—S. Ward. Machinery for the manufacture of looped fabrics.—T. J. Smith. Means of and appliances for facilitating the lighting of gas jets (com.)—C. B. Clough. Apparatus for curing smoky chimneys and ventilating apartments and buildings, mines, and ships.—W. E. Newton, C.E. Construction of electro-magnets (com.)—J. Price. Mode of and apparatus for burning fuel.—W. Jenkinson. Machinery for spinning fibrous materials.

On October 25th.—3464 to 3476.—W. Ginks. Machinery for seaming or stitching skins and fabrics.—J. McGlashan. Softening jute and other fibrous substances, and the machinery or apparatus employed therefor.—W. Holland. Umbrellas and parasols.—R. J. Sellman. Medical preparation for the cure or treatment of splints, spavins, curbs, ringbones, and other like diseases of horses.—A. Lee. Machinery for the grinding of saws.—H. Matterson. Mode or manner of ventilating close and open fire ranges, and apparatus to be used therein.—W. R. Lake. Manufacture of nails or tacks, chiefly designed to be used for the making of boots and shoes (com.) (Complete specification.)—J. Reid. Means of communication between the passengers, guards, and engine drivers on railway trains.—J. Ward. Machinery for drawing and spinning cotton.—T. A. Weston. Machinery or apparatus for raising, lowering, or suspending weights or heavy bodies.—C. Stevenson. Evaporating or recovering furnace or apparatus to be used for evaporating the water in soda lye or liquids containing any valuable sediment or body, so that the same may be rendered fit for being again used for manufacturing purposes.—W. R. Lake. Apparatus or machinery for driving tacks or nails in the operation of lasting boots and shoes, and for other like purposes (com.)—J. T. Parlour. Apparatus for registering fares of passengers in tramway cars, omnibuses, and other public conveyances, and for other like purposes.

On October 27th.—3477 to 3491.—Q. L. Brin. Modes and means for the manufacture of artificial butter, and for renovating rancid or bad butter, part of the apparatus being applicable to the pressing of stearine and other like purposes. —R. J. Worth. Steam pumps.—A. Wood. Manufacture of venetian blinds.—T. F. Finch J. Finch, and A. L. Finch. Apparatus for economizing fuel in fire-grates.—T. Bradford. Machinery or apparatus for washing, boiling, rinsing, wringing, and drying wearing apparel, bed and other linen, or domestic or other textile fabrics, and partly applicable to other domestic or useful purposes.—R. S. Symington. Arranging and applying apparatus for indicating, recording, and giving alarms on the occurrence of change of temperature.—G. G. de L. Byron. Apparatus or loom for weaving (com.)—E. O. Richard. Breaks and couplings of railway trains (Complete specification.)—T. G. Greenstreet. Filtering slop and drawing off the water by apparatus applicable to the ordinary slop-cart.—B. G. George. Method of transferring printed matter to plates of metal.—G. Haseltine. Motive-power engine to be operated by the pressure of water, steam, or compressed air, and capable of use as a pump, blowing engine, or gas exhauster (com.) (Complete specification.) —E. T. Truman. Means or apparatus for effecting intercommunication in trains, partly applicable to other purposes.—F. Wirth. Apparatus for preventing the wreck or foundering of ships or vessels (com.)—H. Bray. Manufacture of gas for illuminating and heating purposes.—J. Wadsworth. Apparatus for warming, ventilating, and cooking.

(Continued on page 25.)

Scientific and Literary Review,

AND RECORD OF PROGRESS IN

ARTS, INDUSTRY, AND MANUFACTURES,

INCORPORATING THE

JOURNAL OF THE INVENTORS' INSTITUTE.

FEBRUARY 1, 1874.

REVISION OF THE PARLIAMENTARY REPORT ON PATENTS.

No. II.

The other propositions of the sub-committee of the Inventors' Institute (already designated *I. I. Com.*) are as follows:—

On paragraph No. 17, *H. C. Rep.* (*a*) and (*b*), the *I. I. Com.* referred back to their views expressed in regard to 6, 16, and 7, *H. C. C. Rep.*

On paragraph 17 (*c*), which refers to concurrent applications for patents, the *I. I. Com.* dissenting from this section, recommend that in the case of concurrent applications for a patent the patent to be granted to the first applicant, provided no fraud or collusion be proved.

On paragraph 17 (*d*) *H. C. C. Rep.*, which relates to Patent Litigations, the *I. I. Com.* assented to that part of this section which relates to trial before a judge, where the preferable resort to a Court of Arbitration cannot be had, but a special scientific jury should only be impannelled where a motion is made for such a jury, by one party to the suit, and the Court concurs, or where both parties concur in desiring it.

On paragraph 17 (*e*), *H. C. C. Rep.*, the *I. I. Com.* state—That no one who does not fulfil the conditions of having "legal scientific or technical experience, or whose time is occupied with other engagements to such an extent as to prevent their giving full attention to such administration," should be selected for the important office of Commissioner of Patents, and that if proper persons are selected they will not require coadjutors or re-inforcement, and that their whole time must be given to their duties if necessary.

[This answer on paragraph 17 (*e*) is, it appears, not to be considered as negativing the desirability of scientific-technical Commissioners being appointed to act as subsidiary to a Chief Commissioner.]

On paragraph 17, *H. C. C. Rep.*, the *I. I. Com.* state—their opinion that "relegation" of the duties entrusted to Commissioners who have themselves been chosen with reference to special fitness, is likely to prove unsatisfactory, unless they retain the full responsibility of the decisions arrived at. The Committee strongly object to any increase of the difficulties now thrown in the way of the obtainer of provisional protection, as they consider that the later stage is the proper one for making such investigations as may be deemed necessary, and that no investigation as to novelty, or as to the invention being properly the subject of a patent, will be productive of good results at any stage (unless of the modified kind proposed by the Inventors' Institute).

They consider, however, that if the Commissioners find an invention already recorded at the Patent Office, they should caution the intending patentee, and if they think fit endorse the same on the face of the patent, thus carrying out the principle of *caveat emptor*. On the clause requiring perfect accordance between a provisional and a complete specification, the committee have already expressed their opinion. No particulars (of practical details) can or ought to be given in a provisional specification, therefore no exact accordance on this point can be expected.

(*g*) Same paragraph—*I. I. Com.* state they have already expressed their objection, which they now confirm.

(*h*) Same paragraph—Accepted as most desirable.

(*i*) Accepted as desirable; but experience shows this is not easily practicable.

(*j*) Same paragraph—Accepted as sound in principle, but it is considered that fit persons should be entrusted with the work, and should be paid liberal salaries.

18 Accepted; with the proviso that no "*ex officio*" appointments shall in any case be made; that Patent Commissioners shall hold no other office, and shall give their whole time to the duties of the Patent Office.

On paragraph 18, it is to be observed that the new Patent Law Committee suggest that it seems desirable that in order to ensure direct Parliamentary responsibility, the President of the Board of Trade, and one of its Parliamentary secretaries, should be Official Commissioners.

19. Accepted.

Reviews.

WATCHWORK.

Review of a Treatise on "Watchwork, Past and Present." By Rev. H. L. Nelthropp, M.A., F.S.A. With illustrations. London: E and F. N. Spon, 48, Charing Cross; New York: 446, Broome Street. 1873.

This is a very readable and thoroughly practical work, which aims at filling what the author deems a gap in our technological literature. The general scope and intentions of the author are thus set forth in the preface:—

During the last century, very many books were printed giving excellent information on the making of clocks and watches—more particularly in French—but all these works have become extremely scarce, and, as a matter of course, expensive, far beyond the means of ordinary persons to buy the same.

The present treatise is designed to supply the deficiency by putting it within the power of all to obtain information at a trifling cost.

Perhaps it may be urged that the subject is not of sufficient interest to induce many to give any time to its study—from this I beg to differ.

In an archæological point of view, it deserves to be studied. Is it not absurd for persons to visit the South Kensington or other museums deficient in the knowledge of a subject of which there are so many fine examples exhibited? Of what use the many watches of every date, size, and style, when the looker-on can only exclaim, here is a watch! or is indebted to the printed label for information? How is it possible for even educated men to feel any interest in the exhibition of articles of vertu, if they have never read, or marked, or learnt for themselves the history, the theory, and practice which have made all these objects so much prized and sought after?

Besides, if there is an indescribable pleasure felt by every individual, no matter of what degree, in becoming the possessor of a good going watch, surely that pleasure ought to be enhanced by being able to give a satisfactory reason for the working of the little machine which is carried daily in the pocket. Will then, men, who are proud of their knowledge, remain satisfied to be considered the mere porters of an article sold to them by a dealer for a purpose? and which is well or ill-repaired according to the honesty of any jobber employed at random, for it is calculated as a certainty that the possessor lacks the needful knowledge which would make him able to appreciate the really scientific workman.

It may be safely stated that were we to go to our universities or public schools, scarcely half-a-dozen youths could be found who know a single thing beyond the fact that they had a watch given them; that they were told it was a lever; that it goes badly; and is always requiring something or other. Why should this ignorance prevail in this age of universal knowledge?

It is useless to deny that the study of watchwork presents many difficulties, the principal one being this, that it is not easy to obtain the practical information without which theory is in a great measure rendered valueless.

As a rule, watchmakers are not desirous of imparting any information respecting their business; and the dealers know little or nothing beyond the mere necessary knowledge required to carry on their branch of the trade. The student is then apparently arrested at first starting; but it need not be so, for to meet this difficulty I have in this treatise *defined* all the terms *used in the trade*; and I have further furnished drawings adapted to show the working of the escapements.

The knowledge thus given has taken a long time to acquire; and I have by perseverance obtained my information in Switzerland, France, and England. In each country I have visited establishments whose proprietors were willing to answer inquiries, and who felt an interest in the well-doing of their trade, without exacting that a footing should be paid by the purchase of a costly timekeeper.

Without some occasional assistance from practical business men, it is scarcely possible for any ardent lover of the art, or well-wisher of the trade, to do justice to a subject by a mere acquaintance with the statements which have appeared in books.

In the hope of rendering my work more complete, I have in the *Appendix* given a translation of M. de Lalande's very excellent treatise on the pitching of wheels and pinions, in which he has laid down everything which is requisite to constitute a perfect pitching.

This treatise by M. de Lalande is extremely interesting, as it was written for the express purpose of simplifying the subject, and bringing it within the intellectual capacity of persons brought up to the clock and watch trade; and who possibly would not have been able to take an interest in any over-learned arguments.

It appeared in Lepaute's treatise on clockwork, 1767, a book which Moinet, "Traité générale d'Horlogerie," says was "reviewed, revised, and augmented by the celebrated Lalande himself."

The student anxious for more information on this branch of the subject is referred to Professor Willis's valuable work on the "Principles of Mechanism," 1870, in which the teeth of wheels, trains, &c., are fully discussed.

In fulfilment of his views and intentions in writing this work, our author, in distinct chapters, treats of Words and Terms used in Watchwork; Tools required for Watchwork; Time; Historical Summary to the End of the Fifteenth Century—from A.D. 1500 to the Present Time; on Calculations of the Numbers for Wheels and Pinions, their Proportional Sizes, Trains, &c.; of Dial-wheels or Motion Work, Length of Time of Going without Winding up; the Verge; Horizontal, or, more correctly, Cylinder Watch; the Duplex; the Lever; the Chronometer, or Detached Escapement; Repeating Watches; Keyless Watches; the Pendulum, or Spiral Spring; Compensation; Jewelling of Pivot-holes; Clerkenwell; Fallacies of the Trade; Incapacity of Workmen; How to choose and use a Watch; and gives an Appendix and Index.

Perhaps the following may prove as interesting as any portion of the work:—

Keyless Watches.—At the commencement of the present century watches, provided with a mechanism which would cause winding without a key, were looked upon with no great favour, and considered mere articles of fancy. A watch can possess no greater defect than to have too many separate pieces in its interior works, consequently it could hardly have been conjectured that keyless watches would have become, as at the present day, quite the fashion, and the mechanism be applied even to cheap Swiss goods, price £2 10s. It is said that the Emperor Napoleon I. possessed a self-winding watch, which was arranged something like a pedometer that at every step he took a weight acted on the end of a lever having a weak spring under it, which was attached to a click working into a ratchet wheel in the barrel arbor, and so wound up the main-spring. One method out of many employed in keyless watches to accomplish the winding is as follows (here the book has an illustrative figure which the description refers to, and we follow this as near as denudation of the letters of reference permits):—The construction comprises a square piece of steel with two short arms, and a steel cap, which is screwed down nearly tight into it, a portion being cut out for its reception. The screw forms also the axis of a wheel. The steel piece moves slightly to the left. Another wheel (small) gears with the wheel first mentioned, and also a wheel set on the barrel-arbor; a click prevents this wheel running back. The minute wheel is constructed pitching into canon-pinion. The hour wheel pitching into minute pinion. On the second arm of steel piece is a steel wheel which by means of a push piece is caused to gear into the minute wheel, and at the same time discharge the small wheel (the second one above mentioned) from the wheel thirdly mentioned. A spring is so placed as to keep the steel piece to its exact position for the winding. In the pendant is an axis carrying at the end an oblique bevelled wheel which plays into the wheel first mentioned. The action is this: If the button or handle of the watch be turned to the left the wheel first mentioned will revolve, causing the wheel secondly mentioned to go round, and so put in motion the wheel set on the barrel-arbor, and winding up the main-spring. If a small knob at the side of the watch case be pressed in then the wheel thirdly mentioned will gear with the proper wheel, and the hands may be set to time. The whole of this motion work lies under the dial.

LIFE OF MRS. SOMERVILLE.

"Personal Recollections, from Early Life to Old Age, of Mary Somerville;" with selections from her Correspondence. By her Daughter, Martha Somerville. London: John Murray, Albemarle-street. 1873.

Here is a work that cannot fail to be highly esteemed; for the life of Mrs. Somerville will have interest alike for the scientific and the general reader, and must be received with especial favour by all who deem the advancement of "Women's rights," as they are termed, part of the programme of progress in the present period of civilization.

Mrs. Somerville, like the venerable and respected Mr. Cornelius Varley, whose decease we lately chronicled in the pages of this journal, was one of those few intellectual veterans whose long lives have carried them on to times far removed from the period when their fame-compelling works were performed, and to an epoch in their existences when their energies cease to have sufficient power to keep up the same measure of activity, which their previous triumphs in the intellectual arena have made the high standard of their capabilities.

In the case of Mrs. Somerville, however, the public interest will not be limited to the consideration of her character as one eminent for intellectual power, for, as an example of the high state of mental culture a woman may attain to, and yet retain all that is estimable and pleasurable in woman's character, she stands pre eminent. The story of her life, as told in the volume before us, is simply and naturally told, principally in her own words, and it introduces us to many reminiscences of men and manners of her earlier days, the former being generally of high position in science, letters, and politics.

At the present day it may not be out of place to remark that the mementoes of the scientific attainments of Mrs. Somerville are to be found in her "Mechanism of the Heavens," "Connection of the Physical Sciences," "Physical Geography," "Molecular and Microscopic Science;" but it is the general view of her character that we will now present to our readers.

Born in the year 1870 as a daughter of a naval officer (afterwards Sir William Fairfax), who was constantly away from home engaged in fighting the battles of his country, she had no educational advantages beyond the average of those common to Scottish gentlewomen of the period, and that these were very meagre her recollections testify; so that the extent of the aid she received in her career of intellectual progress was of very small account indeed; and not only so, but, as her daughter states, she lived amongst persons who took no interest in the studies which proved attractive to her, and who disapproved of her devotion to pursuits so different from those of ordinary young girls at the end of the last century, especially in Scotland, which was far more old-fashioned and primitive than England.

Her simple account of her early days is not without interest, bringing us acquainted with her as a lonely child wandering by the seashore, and on the links of Burntisland, collecting shells and flowers; or spending the clear, cold nights at her window, watching the starlit heavens, whose mysteries she was destined one day to penetrate in all their profound and sublime laws, making clear to others that knowledge which she herself had acquired, at the cost of so hard a struggle.

It was, it appears, not only in her childhood and youth that her studies encountered disapproval. Not till she became a widow had she perfect freedom to pursue them. The first person—indeed the only one in her early days—who encouraged her passion for learning was her uncle by marriage, afterwards her father-in-law, the Rev. Dr. Somerville, minister of Jedburgh, a man very much in advance of his century in liberality of thought on all subjects. He was one of the first to discern her rare qualities, and valued her as she deserved; while through life she retained the most grateful affection for him, and confided to him many doubts and difficulties on subjects of the highest importance. Her daughter (the authoress of this volume) adds the following:—Nothing can be more erroneous than the statement, repeated in several obituary notices of my mother, that Mr. Greig (her first husband) aided her in her mathematical and other pursuits. Nearly the contrary was the case. Mr. Greig took no interest in science or literature, and possessed in full the prejudice against learned women which was common at that time. Only on her marriage with my father, my mother at last met with one who entirely sympathised with her, and warmly entered into all her ideas, encouraging her zeal for study to the utmost, and affording her every facility for it in his power. His love and admiration for her were unbounded; he frankly and willingly acknowledged her superiority to himself, and many of our friends can bear witness to the honest pride and gratification which he always testified in the fame and honours she attained.

No one can escape sorrow, and my mother, in the course of her long life, had her full share, but she bore it with that deep feeling of trust in the great goodness of God which formed so marked a feature in her character. She had a buoyant and hopeful spirit, and though her affections were very strong, and she felt keenly, it was ever her nature to turn from the shadows to all that is bright and beautiful in mortal life. She had much to make life pleasant in the great honours universally bestowed upon her; but she found far more in the devoted affection of friends, to say nothing of those whose happy lot it has been to live in close and loving intercourse with so noble and gentle a spirit.

She met with unbounded kindness from men of science of all countries, and most profound was her gratitude to them. Modest and unpretending to excess, nothing could be more generous than the unfeigned delight she shewed in recognising the genius and discoveries of others; ever jealous of their fame, and never of her own.

It is not uncommon to see persons who hold in youth opinions in advance of the age in which they live, but who at a certain period seem to crystallise, and lose the faculty of comprehending and accepting new ideas and theories; thus remaining at last as far behind, as they were once in advance of public opinion. Not so my mother, who was ever ready to hail joyfully any new idea or theory, and to give it honest attention, even if it were at variance with her former convictions. This quality she never lost, and it enabled her to sympathise with the younger generation of philosophers, as she had done with their predecessors, her own contemporaries.

Although her favourite pursuit, and one for which she had decidedly most aptitude, was mathematics; yet there were few subjects in which she did not take interest, whether in science or literature, philosophy or politics. She was passionately fond of poetry, her especial favourites being Shakespeare and Dante, and also the great Greek dramatists, whose tragedies she read fluently in the original, being a good classical scholar. She was very fond of music, and devoted much time to it in her youth, and she painted from nature with considerable taste. The latter was, perhaps, the recreation in which she most delighted, from the opportunity it afforded her of contemplating the wonderful beauty of the world, which was a never-failing source of intense enjoyment to her, whether she watched the changing effects of light and shade on her favourite Roman Campagna, or gazed, enchanted, on the gorgeous sunsets on the bay of Naples, as she witnessed them from her much-loved Sorrento, where she passed the last summers of her life. All things fair were a joy to her—the flowers we brought her from our rambles, the sea-weeds, the wild birds she saw, all interested and pleased her. Everything in nature spoke to her of that great God who created all things, the grand and sublimely beautiful as well as the exquisite loveliness of minute objects Above all, in the laws which science unveils step by step, she found ever renewed motives for the love and adoration of their Author and Sustainer. This fervour of religious feeling accompanied her through life, and very early she shook off all that was dark and narrow in the creed of her first instructors for a purer and a happier faith.

It would be almost incredible were I to describe how much my mother contrived to do in the course of the day. When my sister and I were small children, although busily engaged in writing for the press, she used to teach us for three hours every morning, besides managing her house carefully, reading the newspapers (for she always was a keen, and, I must add, a liberal politician), and the most important new books on all subjects, grave and gay. In addition to all this, she freely visited and received her friends. She was, indeed, very fond of society, and did not look for transcendent talent in those with whom she associated, although no one appreciated it more when she found it. Gay and cheerful company was a pleasant relaxation after a hard day's work. My mother never introduced scientific or learned subjects into general conversation. When they were brought forward by others, she talked simply and naturally about them, without the slightest pretension to superior knowledge. Finally, to complete the list of her accomplishments, I must add that she was a remarkably neat and skilful needlewoman. We still possess some elaborate specimens of her embroidery and lace-work.

Devoted and loving in all the relations of life, my mother was ever forgetful of self. Indulgent and sympathising, she never judged others with harshness or severity; yet she could be very angry when her indignation was aroused by hearing of injustice or oppression, of cruelty to man or beast, or of any attack on those she loved. Rather timid and retiring in general society, she was otherwise fearless in her quiet way. I well remember her cool composure on some occasions when we were in great danger. This she inherited from her father, Admiral Sir William Fairfax, a gallant gentleman who distinguished himself greatly at the battle of Camperdown. Sir William was the son of Joseph Fairfax, Esq., of Bagshot, in the county of Surrey, who died in 1783, aged 77, having served in the army previous to 1745. It is understood that his family descended from the Fairfaxes of Walton, in Yorkshire, the main branch of which were created Viscounts Fairfax of Emly, in the peerage of Ireland (now extinct), and a younger branch Barons Fairfax of Cameron, in the peerage of Scotland. Of the last-named was the great Lord Fairfax, Commander-in-Chief of the armies of the Parliament, 1645—50, whose title is now held by the eleventh Lord Fairfax, a resident in the United States of America.

These recollections are principally matter noted down by Mrs. Somerville herself, containing statements of incidents in her life, with her reflections upon them; they therefore leave little opportunity for selecting quotations, which could be readily made available for our pages. Suffice it to say, that the work contains many interesting notices relative to such men as Sir Walter Scott, Boulton and Watt, the Herschells, Arago, Cuvier, Delaplace, Humboldt, Lord Brougham, Faraday, and occasionally introduces us to celebrities of the political, artistic, and literary world of the generations just passed and now passing away. In short, the reader of this book will enjoy a chit-chat with a scientific personages of the highest intellectual attainments, who will not weary him with scientific preachments, but will afford him pleasant pastime, which will be none the worse because it is capable of being turned to mental profit.

The following extracts will show that the experiences of everyday life are interspersed with notanda pertinent to the world of science; indeed, as before intimated, the work is as pleasurable for the general reader as it is interesting to those of a scientific turn of mind. Speaking of her girlhood, Mrs. Somerville says:—They sent me to Strange's dancing school. Strange himself was exactly like a figure on the stage; tall and thin, he wore a powdered wig with cannons at the ears, and a pigtail; ruffles at the breast and wrists, white waistcoat, black silk or velvet shorts, white silk stockings, large silver buckles, and a pale blue coat completed his costume. He had a little fiddle on which he played called a kit. My first lesson was how to walk and make a curtsey. "Young lady, if you visit the Queen, you must make three curtsies, lower and lower, and lower, as you approach her. So-o-o"—leading me on and making me curtsey. "Now, if the Queen were to ask you to eat a bit of mutton with her, what would you say?" In fact, much of the book is occupied with this kind of pleasant chit-chat, though such passages as the following, which refers to the important spectrum discoveries, is a sample of portions of the work by no means few or far apart:—

One bright morning Dr. Woolaston came to pay us a visit in Hanover-square, saying, "I have discovered seven dark lines crossing the solar spectrum, which I want to show you." Then, closing the window shutters so as to leave only a narrow line of light, he put a glass prism into my hand, telling me how to hold it. I saw them distinctly. I was among the first—if not the very first—to whom he showed the lines, which were the origin of the most wonderful series of cosmical discoveries, and have proved that many of the substances of our globe are also constituents of the sun, the stars, and even of the nebulæ.

But these memoirs are not restricted to notices of home-life, or to scientific notes; they abound with reminiscences of eminent personages of all kinds, of which the following is an example:—Sir Sydney Smith was still in Paris trying to renew the Order of Knights Templars. Somerville and I went with him one evening to a reception at the Duchesse d'Abrante's, widow of Junot. She was short, thick, and not in the least distinguished-looking, nor in any way remarkable. I had met her at the Duchesse de Broglie's, where she talked of Junot as if he had been in the next room. Sir Sydney was quite covered with stars and crosses, and I was amused with the way he threw his cloak back to display them as he handed me to the carriage.

We could amuse ourselves by picking out plenty of such pleasant bits of memorials of past days, but we think we have done enough to show our readers what pleasure and profit may be obtained by the perusal of this work.

ELEMENTARY CHEMISTRY.

"An Easy Introduction to Chemistry." Edited by the Rev. Arthur Rigg, M.A., late Principal of the College, Chester. Rivingtons. London, Oxford, and Cambridge. 1873.

Most works on chemistry now issued from the press are for the purpose of instruction only where the usual formula are given, and various equations understandable and necessary to the student are stated. Then there are others which are written exclusively for those advanced in the study of chemistry to its highest branches. But last, and by no means least, there is that class of works which are designed not only for the purpose of imparting a solid but simple view of the science, but also to serve as a book of useful information for both the scientific and the unscientific reader. Of this last class the work under notice is an example, and we think that its contents will be read with pleasure by the young and old alike, to whom it will be a source of profitable instruction. According to the editor's preface, the work "is based upon a 'First Book of Chemistry,' by Dr. Worthington Hooker, published in America, and is intended to convey information in respect to changes which are likely to attract the attention of young persons who observe and inquire. The book professes to be only an introductory one; but," as the editor rightly observes, "may, however, quite consistently be an interesting and accurate one;" and we think all this has been effected, and that the incentive to progress in chemical knowledge afforded by this work bids fair to lead all who use it to make further inquiries and deeper research into the science of chemistry.

The book is written in clear, intelligible, and simple language, and the various experiments are described and illustrated in a way that will render the work of peculiar service to the young student. In the way of illustration, we cannot do better than give the following extract:—

Persons are sometimes injured by charcoal being burnt in a close room, and even death is occasioned. It is the carbonic gas produced by a union of carbon in the charcoal with oxygen in the air that causes this. Hence, you see, charcoal never ought to be burnt except in the open air or in a room in which doors and windows are open, or in fireplaces where the chimney supplies a way by which the carbonic gas can escape. You see, too, what remedy to apply if any one be poisoned by gas from burning charcoal. It is to open doors and windows to let fresh air enter. Remember, that doors must be opened as well as windows, for air must come along the floor to drive out the gas.

If a grown-up person and a child are in a room where charcoal is burned in an open furnace, the child will be affected first, because its mouth is so much nearer the floor than the mouth of the adult.

QUALITATIVE BLOW-PIPE ANALYSIS.

"Elderhort's Manual of Qualitative Blowpipe Analysis and Determinative Mineralogy." Edited by Henry B. Nason, Ph.D., Rensselaer, Polytechnic Institute, Troy, N. Y., and Charles F. Chandler, Ph.D., Columbia College School of Mines, New York. Philadelphia and London: T. Ellwood Zeel.

By the title page of this work, we are informed that it is a fourth edition, and we may therefore reasonably infer that on the other side of the Atlantic it is a work of recognized merit; and, although not professing to be deeply versed in this branch of science, yet our knowledge does enable us to say that the work is a very serviceable and reliable one. In this edition there have been added various and necessary alterations and amendments, which we think would be of service to the persons using the work, and enhance its value. But we think that as the editors have considered it necessary to introduce amongst other matter a short statement in reference to spectrum analysis, it would have been as well had they given a more complete statement than they have done However, the work is one that may be relied on for correct and excellent information, and as such we commend it to our readers.

GENERAL SCIENCE.

"Darwinism and Design." By George St. Clair. Hodder and Stoughton.

This is an attempt to make the religious views of the Darwinian theory fit in with the creation of man, that is, although man is the product of evolution, yet, every here and there, Divine interference shows the work of a superintending designer.

"Contributions to Solar Physics." By J. N. Lockyer. Macmillan and Co.

We are not in a position to do more than notice the publication of this work.

"Geology." By Archibald Geikie, LL.D. Macmillan and Co.

This is a "Science Primer," which will be found useful in elementary tuition.

MECHANICAL TEXT-BOOK.

"A Mechanical Text-book; or, Introduction to the Study of Mechanics and Engineering." By W. Macquorn Rankine, C.E., and E. F. Bamber, C.E. Griffin and Co.

As might be expected from any work with which the late lamented Professor Rankine had anything to do, this is a high-class production. It is, however, open to some objection, on the ground that either too much or too little mathematical lore is introduced. As a rule, elementary works in the experimental sciences should require no more than the merest elementary knowledge of mathematics in the students using them; but this work is mathematical to an extent far beyond the tyro's mark, and, at the same time, it does not reach that of the professed mathematician's. However, the book is a very useful and valuable work, and as such we commend it to our readers.

TRADE SERIALS.

"The Furniture Gazette; an Illustrated Journal treating of all Branches of Cabinet Work, Upholstery, and Interior Decoration." New series.

This journal, which deals with all matters relating to the internals of building, so to speak, is still supplying the trade and connoisseurs with valuable information.

THE NATURALIST IN NICARAGUA.

"The Naturalist in Nicaragua, with Observations on Animals and Plants." By Thomas Belt. Murray.

This valuable yet unpretentious volume, by one who may well be considered an authority upon any subject on which he speaks, cannot fail to interest a large section of the reading public, besides those who are engaged in scientific investigations.

The "Writing-Ball"—The Emperor of Austria has just conferred the medal Pro Literis et Artibus on the inventor, Mr. Malling-Hansen, and the manufacturer, Mr. Jurgensen, of Copenhagen, for the ingenuity and utility shown in the invention and manufacture of this useful instrument, which was exhibited at the Vienna Exhibition.

ON AUTOMATIC RAILWAY CARRIAGE COUPLINGS.

By W. Gadd, Esq., C.E., Manchester.

In this paper, read at the Inventors' Institute, on 11th December last, the author, after referring to the importance of the subject, and to various failures in providing a satisfactory system of railway couplings, proceeded as follows:—

The essentials of success, or, in other words, the problem to be solved, I conceive to be as follows—first, that the coupling of the carriages must take place automatically by gentle collision. Second, that the operation of uncoupling should be easy, and performed from some convenient part of the carriages, avoiding the necessity of the operator going between them. Third, that the apparatus should be simple in construction and in action, having few and strong parts, and adaptable to the present design of carriage; and, fourth, it is of the first importance that the construction of the coupling should be such that the apparatus will be exactly alike at each end of the carriage, that is to say, there must be no right and left coupling, or front and back coupling as such, but the carriages should couple from either end of one carriage to either end of another. I also think it would be a further advantage if, combined with these conditions, the couplings had such a construction that, in the event of an engine or carriage leaving the metals, or jumping the same, such engine or carriage should have a tendency to disengage itself from the rest of the train, which would then have a better chance of keeping the line.

Mr. Chairman and Gentlemen, I now propose explaining to you a method of coupling which, I believe, will fulfil the whole of the requirements or conditions I have just laid down. This method is now becoming known as "Green's Automatic Coupling," and is the invention of Mr. William Green, an architect, residing in the town of Hyde, in the county of Cheshire.

I have prepared a rough sketch of the method on a scale which I trust will enable you to follow my explanations with ease.

This coupling consists, as you will perceive, of a radial hook, of wrought iron, and of rather peculiar construction. It is jointed by means of a strong pin joint, to the draw bar, which draw bar is constructed with a head for jointing purposes, instead of the usual hook. It will thus be seen that the line of the hook's movement is lateral, and is held in position by means of the spring. In this case a plate spring is shown, but a helical or any suitable form of spring may be used, or the hook may be held in position by means of a weight. The peculiarity of the hook's construction is its breadth, the object of which I will explain further on.

This radial, held in a position and up to a stop, by suitable means, is all that is necessary for coupling, the rest of the apparatus being for disengaging purposes, the arrangement and detail of which may be varied to almost any extent. You will please observe that if a radial hook in this position is placed at each end of a carriage, the mere fact of turning that carriage round reverses the position of the coupling relatively, so that two carriages meeting with either ends would form an interlocking coupling. This will be better seen and understood practically by reference to the working model which I will submit to your inspection at the close of my remarks on the subject. It will then be apparent that this result is due to the position of the coupling hook solely, and to its taking a sideway or lateral motion.

When the two hooks come in contact with each other, they strike the outer inclines, and so force each other asunder, and when the requisite degree of tension to the buffer-springs is obtained, the hooks engage each other. The length of the hook is calculated to cause the required tension on the draw-bar, and thus ensures regularity of tension throughout the train, and uniformity of tension at all times to the same carriage, or, if it is thought desirable to have varying tensions for varying lengths and weights of trains, a shortening draw-bar may be provided, which could be operated upon from the side of the carriage by means of a shaft with worm and wheel, or by screw or other action. The line of movement taken by the hook upon the pin-joint or fulcrum being lateral, the coupling readily accommodates itself to any curve which may present itself either in one direction or the other. For, although on one side the hook is held up to a dead stop, beyond which it cannot turn, yet it may always be turned in the opposite way against the spring; and, as two couplings of this description, constructed alike, when brought into juxtaposition are relatively reversed, it naturally follows that one is free to turn in one direction and the other in the opposite.

The method here shown of unlocking is as follows: the operator stands on the step of the carriage, near the end thereof, or it may be on a platform, so that disengagement can be effected either during motion or not. He takes hold of the lever handle E, and pulls the same towards him, when disengagement takes place by means of the rod H, attached by pin joint at one end to the large lever E, and at the other to the end of the small lever I, which turns upon the same fulcrum as the radial hook A. On this same hook A, and near the fulcrum, is a projection or pin K, against which the small lever I presses as it is pulled forward, whereby the radial hook is forced backward, and so disengaged from a corresponding hook on the other carriage. The hook can be locked in this open state, or allowed to return to the original position ready to couple itself with any carriage that may be prepared for contact therewith. It will be easily understood that disengagement can be effected from either carriage, and, as the uncoupling apparatus of one end of the carriage is placed on one side, and that of the other end on the other side, it necessarily follows that the operation of uncoupling may be performed from whichever side of the train happens to be convenient. In the model which I shall have the honour to place before your notice, there are modifications of the method of uncoupling which may be multiplied almost indefinitely without departing from the principle laid down, namely, that of coupling by means of a sideway hook having a lateral motion, and attached to the drawbar, or end of the carriage. The radial hook is made seven inches wide or deep, so that any ordinary jumping of the carriages will not disengage the same by allowing the hooks to lift over one another; but if by any accident more than the width of the hook is jumped by a carriage, disengagement at that spot takes place. Of course the width of the hook may be six, seven, eight, or nine inches, or any width which shall be found most reliable in practice. This tendency to become disengaged under extraordinary circumstances, I take to be of great value and importance, for how often has it occurred when an engine or a carriage has left the line, and, we will say, gone down an embankment, that it has dragged the greater portion of the train in its wake, whereas, if the coupling had been of the character just described, the damage would have been, most probably, confined to that engine or carriage which first left the track.

It thus appears that this method of coupling fully complies with the conditions I previously laid down, namely, the carriages are coupled automatically by gentle collision. The operation of uncoupling is performed from a convenient part of the carriage, and whether in motion or not. I may here state that it is merely a question of detail to cause the uncouplement to take place from the inside, or any part of the carriage. In the case of the guard's break-van, an inside apparatus would of course be used, so as to enable a portion of the train to be slipped by the same form of coupling, for which purpose a special kind has now to be used. The apparatus shown is strong and simple (especially the coupling-hook itself), both in action and construction. It has few parts, and can be applied to carriages now in use without much change in the parts, except those portions which are entirely substituted. And what is of the greatest importance, it is identical in construction at both ends of a carriage, making it of no moment from which end of the carriage coupling takes place. Perhaps the greatest drawback to its rapid introduction is the varying height of the rolling stock on some of our railways. But this is a great evil in itself, and, doubtless, one source of danger, so that a system of coupling which would compel something like uniformity in this respect alone, would be a great gain.

Perhaps I may be allowed to state before closing my remarks on this subject, that the invention is being carried out under my own supervision as regards the conducting of experiments, negotiations, &c.

In conclusion, I trust that I have made this matter clear to your understandings, and that the invention has suffered nothing from my explanations.

SINGLE RAIL.

AMERICAN papers notice the completion recently, at a machine shop in Gloucester, New Jersey, of a four-ton locomotive, or steam velocipede, resting upon two wheels, one following the other, and designed to run on one rail. The rail or track upon which it is to run, a sample of which is laid in the yard of the builders, is styled a "Prismoid, or one-track railway," and is composed of several thicknesses of plank, built up in the style of an inverted keel of a vessel, with a flat rail on the apex. Upon a trial a speed of about 23 miles an hour was attained, and the inventor and patentee claims that the speed can be almost doubled on a lengthened track. The track upon which the trial was made contained 36ft. of lumber and 18lb. of iron to the lineal foot, proving itself equal to a span of 20ft., remaining firm and unyielding under the pressure of the engine as it traversed the road. The revolving flanges attached to the engine and which run on the outside of each wheel, it is said, absolutely lock the rolling stock to the prism, and obviate the necessity of so much heavy rolling stock in light traffic at a high rate of speed. It is also claimed that a prismoidal railway, built with a base of 14 inches, angles 45 degrees, can be built at a cost of $3,000 per mile. The inventor is of opinion that his engine and track are particularly adapted for the propelling of canal boats. The engine was to be shipped to Atlanta, Georgia, where it goes into operation on a street railroad, built at an elevation of 12ft. above the side walk.

UNIVERSAL PATENT LAWS.

"The true basis of all legislation"—said Dr. Haseltine at the Vienna Patent Congress —"is universal justice; and fortunately for the objects of this Congress, justice to inventors of all nations accords with the highest national interests. The more complete the justice to inventors without regard to state boundaries, the greater the ultimate advantage to the nation. The recognition of this principle is essential to all equitable patent legislation and an indispensable condition of the assimilation of the patent laws of nations, which assimilation upon a liberal basis will remove the valid objections to existing systems and will secure to inventors an adequate compensation for their inventions. This assimilation made possible by the influence of modern inventions upon the political relations of states will conciliate the opposition to isolated patent systems, and tend to unite nations in the bonds of universal brotherhood.—The proposition to assimilate these systems is no new invention, though it has been reserved to this Congress to inaugurate the coveted reform by a public declaration of the cardinal principles of a general system. The eminent Director of the British Patent Office made a similar proposition seventeen years ago to the Royal Commissioners of Patents, and visited the chief European States to arrange plans for an assimilation of the various patent systems, and his suggestions were favourably received by the authorities. The Select Committee of the British House of Commons has recommended this assimilation, and the most earnest advocate of 'free trade in inventions' on that Committee was the first to urge immediate action in this matter upon British Ministers who have taken the first step towards assimilation by the collection and publication of the various patent laws and regulations. The President of the United States has accredited a delegate to this Congress, while other Rulers have expressed their interest in the object of our deliberations.—The spirit of the age is favourable to success, and by wise counsel we may do more for the material interests of mankind than any Congress of modern times, but the real work will commence when our labours have ended.—The price of every great and beneficent reform is continued agitation, which, in time, creates public opinion, the supreme ruler in all liberal Governments, of which opinion the Press is the educator and the organ by whose aid we may reasonably hope in our generation to secure equitable patent systems, uniform in principle and co-extensive with civilization."
—*The Cosmopolitan*.

THE VITRIFIED FORT ON THE BARMEKYNE OF ECHT, ABERDEENSHIRE.

AT a distance of about twelve miles from Aberdeen, about a mile to the north-west of the village of Echt, and lying between the Echt and Skene turnpikes, lies the Barmekyne of Echt, a prettily wooded hill, which has been long associated with pic-nic parties, and which contains near its summit the remains of a vitrified fort.

A few remarks respecting it may not be uninteresting.

Near the summit of the hill are two, what may be called, concentric circles of stones, for the outer line of stones seems to be a circle, and the inner one, if not a circle, is a polygon. These two circles lie the one within the other, at a distance of about 9 or 10 yards from each other. The diameter of the inner circle is probably about 100 yards, while that of the outer one is about 120. They are joined together at various points by connecting walls. Thus, at the south-west part of the fort a couple of walls connect the two concentric walls, so as to form a passage between them, and likewise extend to a considerable distance beyond the outer wall. Again, they are connected by a single wall at the south side of the fort, and about 17 yards to the eastward by another single wall. Likewise at the south-east part of the fort the concentric walls are joined by two walls, forming a sort of passage between them, and extending a considerable distance beyond the outer wall. The breadth of the inner wall, as it stands, is about 15 feet at the base, but the stones of it having been very much knocked down, 8 feet would probably be the outside limit of its breadth at its base as it originally stood.

The breadth of the outer wall, as measured at one part, is about 4½ feet at about 3 feet from the ground. It is difficult, however, to determine the exact height of a particular stone above the real base of the wall, inasmuch as the ground at both sides of the wall is in many places raised by stones covered with turf. The outer wall is much more entire than the inner one, but it is much smaller. The stones of the walls, which are very much overgrown with vegetation, vary in size, some being large boulders, while others are not larger than a man's hand.

There seem to have been other walls or fortifications besides the two mentioned above, but these being beyond the two specified, and further down the hill, and being considerably enveloped in wood, and being, moreover, at least in one part, considerably overgrown with moss and turf, are not nearly so conspicuous as the two previously alluded to.

TUNNEL BETWEEN ENGLAND AND FRANCE.

ON Tuesday, December 9th, 1873, at the Institution of Civil Engineers, T. Hawksley, Esq., President, in the chair, a paper "On the Geological Conditions affecting the Construction of a Tunnel between England and France," was read by Mr. Joseph Prestwich, F.R.S., F.G.S., Assoc. Inst. C.E.

The author, in this paper, reviewed the geological conditions of all the strata between Harwich and Hastings on one side of the Channel, and between Ostend and St. Valery on the other side, with a view to serve as data for any future projects of tunnelling, and to show in what directions inquiries should be made. The points considered were the lithological characters, dimensions, range and probable depth of the several formations. The London clay, at the mouth of the Thames, was from 200 feet to 400 feet thick, while under Calais it was only 10 feet, at Dunkirk it exceeded 264 feet, and at Ostend it was 448 feet thick. He considered that a trough of London clay from 300 feet to 400 feet, or more, in thickness, extended from the coast of Essex to the coast of France, and, judging from the experience gained in the Tower Subway, and the known impermeability and homogeneity of this formation, he saw no difficulty, from a merely geological point of view, in the construction of a tunnel, but for the extreme distance—the nearest suitable points being 80 miles apart. The lower tertiary strata were too unimportant and too permeable for tunnel work. The chalk in this area was from 400 feet to 1,100 feet thick; the upper beds were soft and permeable, but the lower beds were so argillaceous and compact as to be comparatively impermeable. In fact, in the Hainaut coal fields they effectually shut out the water of the water-bearing Tertiary strata from the underlying coal measures. Still, the author did not consider even the lower chalk suited for tunnel work, owing to its liability to fissures, imperfect impermeability, and exposure in the Channel. The Gault was homogeneous and impermeable, but near Folkestone it was only 130 feet thick, reduced to 40 feet at Wissant, so that a tunnel would hardly be feasible. The lower green sands, 260 feet thick at Sandgate, thinned off to 50 feet or 60 feet at Wissant, and were all far too permeable for any tunnel work. Again, the Wealden strata, 1,200 feet thick in Kent, were reduced to a few unimportant rubble beds in the Boulonnais. To the Portland beds the same objections existed as to the lower green sands, both were water-bearing strata. The Kimmeridge clay was 360 feet thick near Boulogne, and no doubt passed under the Channel, but in Kent it was covered by so great a thickness of Wealden strata as to be almost inaccessible; at the same time it contained subordinate water-bearing beds. Still, the author was of opinion that, in case of the not improbable denudation of the Portland beds, it might be questionable to carry a tunnel in by the Kimmeridge clay on the French coast, and out by the Wealden beds on the English coast. The oolitic series presented conditions still less favourable, and the lower beds had been found to be water-bearing in a deep Artesian well recently sunk near Boulogne. The experimental deep boring now in progress near Battle would throw much light on this part of the question.

The author then passed on to the consideration of the Palœozoic series, to which his attention was more particularly directed while making investigations, as a member of the Royal Coal Commission, on the probable range of the coal measures under the South East of England. The author, therefore, considered that it would be perfectly practicable, so far as safety from the influx of the sea water was concerned, to drive a tunnel through the Palœozoic rocks under the Channel between Blanc Nez and Dover, and he stated that galleries had actually been carried in coal, under less favourable circumstances, for 2 miles under the sea near Whitehaven. But while in the case of the London clay the distance seemed almost an insurmountable bar, here again the depth offered a formidable difficulty. As a collateral object to be attained, the author pointed to the great problem of the range of the coal measures from the neighbourhood of Calais in the direction of East Kent, which a tunnel in the Palœozoic strata would help to solve. These were, according to the author, the main conditions which bore on the construction of a submarine tunnel between England and France. He was satisfied that on geological grounds alone, it was in one case perfectly practicable, and in one or two others it was possibly so; but there were other considerations besides those of a geological nature, and whether or not they admitted of so favourable a solution was questionable. In any case, the author would suggest that, the one favourable solution admitted, it might be desirable, in a question involving so many and such great interests, not to accept an adverse verdict without giving all those considerations the attention and deliberation which the importance of the subject deserved.

Granting the possibility of the work in a geological point of view, there were great and formidable engineering difficulties; but the vast progress made in engineering science during the last half century, led the author to imagine that they would not prove insurmountable, if the necessity for such a work were to arise, and the cost were not a bar.

The Franklin Institute of Philadelphia, considering the want of certainty and accuracy existing in the science of dynamics, have appointed a Committee "for the purpose of establishing precision in the meaning of dynamical terms, and to select and approve such terms as may be found proper, and reject those which they consider unnecessary."

Under the title of "The Conservation of Energy," by Professor Balfour Stewart, Messrs. H. S. King and Co. publish a valuable elementary work, equally suitable for junior students as for those who are wholly unacquainted with the subject with which it deals.

An admirable paper, "On the Jade of the Kuenlun Mountains," has been communicated to the Academy of Science of Munich by Hermann von Schlagintweit, and published in the *Sitzungsberichte* of the Academy. The author visited the quarries on the Kara-kash river, which formerly supplied the Chinese with much of their jade. It may be remembered that these quarries were popularly described some time ago by Dr. Cayley. Although the title of Schlagintweit's paper refers only to the jade of Khotan, yet the author gives much information respecting the mineral from other localities, and discusses the source of the jade which is found in the pile-dwellings of the Swiss lakes. He also clearly points out the means of distinguishing true jade, or nephrite, from the closely-allied minerals known as jadeite and saussurite.

Correspondence.

To the Editor of the SCIENTIFIC AND LITERARY REVIEW.

SIR,—In returning to you my thanks for having so kindly placed before the public in the pages of the REVIEW my memoir upon the subject of "The Utilisation of Tidal Force," I now beg to call attention to the typographical inaccuracies, and the following emendations of the statements already published. In paragraph 1, I wish "basis" to be read as "ratio;" in paragraph 2, for "friction" as "incline," for "agency which men" as "agency which even;" in paragraph 6, for "relief of the expended volume of water" as "each expended volume of water," for "efflux of the tide" as "reflux, &c.," for "each staff to full and half ebb" as "each half to full and half ebb;" in paragraph 11, for "in the discharge of culverts" as "in the discharge culverts."—I am, Sir, yours obediently,

JOHNSTONE NAPIER.

To the Editor of the SCIENTIFIC AND LITERARY REVIEW.

SIR,—The article on my patent Breakwater Steamer in the last number of the REVIEW was rather too brief. I hope you will allow me to supplement it, by mentioning what I deem an important modification covered by my patent, viz., to have the tube or tubes for the screw or screws confined to the vicinity of the stern instead of extending from stem to stern; thus, if it be thought inexpedient to have the tube or tubes extending the whole length of the vessel, one tube (from the stern) might have a branch opening to each side; or, better still, two tubes might extend a certain length along each side, either within the side of the vessel or without, having a screw or propeller within each.

It seems to me that flat-bottomed boats, on the breakwater principle, might be of great use in landing passengers through the surf at Madras or elsewhere, since it matters not when or whence the waves may come, they find a smooth slope on which to expend their force harmlessly.

Such vessels might, perhaps, be useful as life-boats.—I am, your obedient servant,

W. S. CARMICHAEL, M D.

3, Annandale-street, Edinburgh,
December 11th, 1873.

The Council of the Geological Society have awarded the Wollaston Medal to Prof. Heer, of Zurich, and the balance of the Wollaston Donation Fund to M. H. Nyst, of Brussels. The Murchison Medal was awarded to Dr. Bigsby, and the balance of the Murchison Fund is to be divided between Mr. Alfred Bell and Mr. Ralph Tate, F.G.S.

The "Journal" of the Scottish Meteorological Society for the quarter ending June, 1873, has just been published. Prof. H. Mohn, of Christiana, contributes a paper "On Certain Effects of Currents on the Temperature of the Sea and Air."

M. Faye, in a reply to M. Tarry, on the question of "the Formatian of Terrestrial and Solar Waterspouts," brought before the Académie des Sciences, on the 1st of Dec., some striking facts connected with the formation and the progress of terrestrial waterspouts.

In the "Annales de Chemie et de Physique" for January will be found an interesting paper, by M. Barthélemy, "On the Peculiar Undulations produced on the Surface of Liquids under the Influence of Vibrations." These peculiar ripples have been studied by Mr. Tomlinson and others, but many new and curious facts have been observed by M. Barthélemy.

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THE INVENTORS' INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE, LONDON.

Established 1st May, 1862.

Past Presidents:

Sir David Brewster, K.H., LL.D., F.R.S., &c., from the establishment of the Inventors' Institute, till his decease, February, 1868. Lord Richard Grosvenor, M.P.

Chairman of the Council:

SIR ANTONIO BRADY.

NOTICES.—SESSION 1873-4.

Thursday, February 5th.—On "Constrnction of Iron War-ships and Fort-faces." By J. Bell, Esq., C.E., F.R.I.B.A.

Thursday, February 19th.—On "Suppressing Fires by novel automatic means of indicating the presence thereof in Buildings." By P. A. Blake, Esq.

TO MEMBERS OF COUNCIL.

Council meetings to take place at 7 p.m. on same evenings.

Subscriptions are payable to Mr. G. A. Stretton, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. Campin, Sec.

Proceedings of the Institute.

A council meeting was held on December 11th, 1873, Mr. A. J. Murray in the chair. This was a *pro forma* meeting preceding the members' meeting of the same evening.

The minutes of the last meeting were read and confirmed as being correctly entered.

The following gentlemen, admitted members of the Institute, were ordered to be placed on the list of members:—Messrs. J. Beale, P. H. Williams, W. H. Silcock, J. McSkinning, Marsham, Adams, Penrose, M. Fenton, O. C. D. Ross, Captain T. R. D. Bingham, H. W. Pendred, C.E., J. Fielding, J. Ellis.

At the third members' meeting, held at 4, St. Martin's-place, on Thursday, December 11th—Mr. A. J. Murray, Member of the Council, in the chair—Mr. W. Gadd, C.E., of Manchester, read a paper on "Automatic Couplings for Railway Carriages," which is given in another column.

After the paper had been read, the following discussion ensued:—

Mr. Murray (Chairman), in inviting discusion, said he thought the invention was one of great merit, but as he saw many gentlemen present who were well qualified to give an opinion on the subject, he would call upon them to do so.

[Continued on Page 22.]

Monthly Notices.

The "Creeping" of Railway Rails.—This peculiar movement, which has been ascribed to the motion of the earth, is, it seems, found more apparent in the western rail if such lines run north and south.

Sound and Music, &c.—Under this title Messrs. Macmillan and Co. have recently published a work by Sedley Taylor, M.A., which investigates the value of mathematical theories of music, and enforces what everyone who knows anything about the matter fully recognises, that such theories must be taken *cum grano salis*, the salt in this case being "musical taste."

Map Drawing by Telegraph.—M. Dupuy de Lorne recently made an exposition at the Paris Academy of Sciences, of a new system for sending a plan or topographical sketch by telegraph. Over the plan or map is placed a graduated semicircular plate, or glass graduated; in the centre is a radial arm, also graduated, which carries, in a slide, a piece of mica with a blade point. A fixed eye-piece is adjusted, and, looking through this, the mica point is carried successively over all the points of the plan to be reproduced, and the polar co-ordinates of each noted. The numbers thus obtained are transmitted by telegraph and are laid down by the receiver, who uses a similar arrangement to that referred, and thus obtain a correspondent's map.

A Saw of Diamonds.—"The American Manufacturer and Builder" states that at the Exhibition of the American Institution a saw composed of diamonds is used for cutting stone. The saw is on the reciprocating saw principle, the cutting tools being diamonds set in cutter blocks on a steel blade as a guide.

Passage of Gases through the Membranaceous Tissues of Plants.—According to M. M. A. Barthélemy, the leaves of certain varities of the Begoniaceæ, which are thin on the living plant, are reduced during winter to the condition of pellicle endued with elasticity. Those were employed as colloid membranes, and Graham's experiments were repeated, and compared with the films of caoutchouc by M. Barthélemy. These experiments prove the dialysis of carbonic acid by the living plant through the cuticle of leaves, in manner precisely similar to the endosmose of membranes, or of porous vessels, in the experiments of Dutrochet and Dehérain. The details will be found in the "Comptes Rendus," No. LXXVII.

International Copyright.—The commission charged to prepare a revisal of the treaties relative to literary property and fine arts copyrights between France and England, met at the Foreign Office, in Paris, on the 5th Dec. The members of the Commission are: M. Paul Féval (as representative of the Society of Authors and Dramatic Composers), MM. Müller, Oscar Comettant, Paul Saunière, and Pierre Zaccone (for the Society of "Gens de Lettres"), and Mr. Kennedy and his secretary for the English Government. The French representatives protested strongly against the system of "adaptations," which they considered were, in point of fact, piracies now carried on in England. Mr. Kennedy is stated to have replied, he felt sure the British Government would afford satisfaction for any abuses which could be properly brought home. M. Gavard, who was present for the French Minister, asked M. Oscar Commettant to draw out a note on behalf of the music publishers, which was annexed to the minutes of the meeting. Out of thirty-seven states which have conventions with France, only two, England and Spain, have not declared against the plan of depositing copies of works as guarantees of proprietorship on the part of French authors. The system of registration at Stationers' Hall is regarded as most inconvenient—a permanent menace to authors who fear to see their rights confiscated for the profit of everybody except themselves; and the impossibility of always registering within three months has been recognized by the Commission. It is, therefore, formally decided that the system of registration at Stationers' Hall will be abandoned by Great Britain, and that a more liberal treaty of copyright be entered into—one more consonant with honesty.—*Athenæum.*

Professor Galloway has been appointed Dean of the Royal College of Science in Ireland for the year, and the Education Committee of Council have amalgamated the Professorships of General and Applied Chemistry in the College, and conferred the same upon Mr. Galloway.

Directorship of the New Florence Observatory (declined by Father Secchi), has been accepted by Signor Schiaparelli, for some time past in charge of that at Milan. This astronomer obtained the gold medal of the Royal Astronomical Society of London last year (February, 1872), in recognition of his discoveries. In 1861 he discovered the small planet Hesperia, and three years afterwards was the author of a valuable mathematical paper on Physical Astronomy. He has made himself especially known for his remarkable discovery of the connexion between comets and meteoric showers. In the case of the November meteors, in particular (or Leonides, as they have been called, from the position of their radiant point in the heavens), he was able to show an identity of orbit with the first comet of 1866.

Johnson, Matthey & Co.—The Emperor of Austria has conferred on this firm the Imperial Order of Francis Joseph, for their valuable contributions to the cause of metallurgical science.

Whitburn's Wood Decoration consists in printing on soft white pine. The process is simple, and might be used with good effect as a cheap mode of decorating furniture.

New Books on Natural History.—Amongst noticeable works just issued from the press, we have to mention "The Illustrated Book of Poultry," by Lewis Wright (Cassell, Petter & Galpin.) "Pheasants for Coverts and Aviaries," by that eminent naturalist, B. Tegetmeir (Cox), and "The Smaller British Birds," by H. G. and H. B. Adams (Bell & Sons).

Prof. Challis on a Theory of the Source of Terrestrial Magnetism is the title of a paper in the last number of the "Philosophical Magazine," explaining his views of the modes of generation of those steady streams of the ether, by the agency of which the principal facts of the proper magnetism of the earth may admit of explanation.

Combustion of Water.—Prof. C. Piazza Smyth, the Astronomer-Royal of Scotland, in a paper read at the Manchester Literary and Philosophical Society, said "that water is a far more powerful exploder than gunpowder if you can get the water to explode at all." After showing that great heat will, under certain conditions, cause water to explode, he leaves the further development of the subject in the hands of men of science.

Mr. Frederick Ransome has lately made public some recent improvements in the manufacture of Artificial Stone; a new and improved variety of which he gives the name of Apœnite.

Duration of Discharge of the Leyden battery, by Herr P. Reiss, is the title of a paper in Poggendorff's "Annalen." The author maintains that the time occupied by the discharge is, in general, not the same as that of the spark.

Prof. Helmholtz, of Berlin, has communicated to the Royal Prussian Academy of Sciences the results of his researches on the polarization of platinum electrodes employed in electrolysis.

Sir J. Lubbock on the Origin and Metamorphoses of Insects is the title of a new work, issued by Macmillan and Co. It is an amplification of the worthy baronet's address delivered as President of the Biological section of the British Association, at Brighton, in 1872.

A few days only before his death, Prof. Agassiz completed a paper "On Evolution and Permanence of Type." This has been printed in the *American Monthly*, and is well deserving attention, the author's views with regard to the evolution hypothesis being well known.

THE INVENTORS' INSTITUTE.

(Continued from page 21.)

Mr. MACKEY thought that the mode of engaging and disengaging shown by this invention was a step in the right direction. He was not aware of anything like this coupling, though he had seen an approach to it tried on the London, Chatham, and Dover Railway, but he had never studied its action. Loose couplings, in order to show their efficiency, should be tried at high speeds. He would like to know whether this coupling admitted of foreign carriages being attached to a train? The invention seemed to be very promising.

Mr. ROE said he would like to know whether the invention was applicable where a carriage has spring buffers? also if applicable to a cattle-truck, where you find no springs? and whether in the latter case the blows would be likely to cause the coupling to shoot beyond the mark, and become disengaged. Further, when spring buffers are used, then, he thought, there might be some difficulty in engaging, by reason of the resistance of the springs, but in order to overcome this he considered that the coupling should be made to project, say, three inches before the buffer, and so to engage two carriages you will have a pressure of, say, six inches. He did not see much difficulty in the case of luggage trains, where springs were not used. But it seemed to him that the one objection to the invention would lay in the spring that was used to keep the coupling up to its work. Still, in his opinion, its great advantage was that it was the negative state of these springs that keeps the coupling in order.

After a few incidental observations by other gentlemen present,

Mr. GADD stated that it was quite true that the great advantage lay in the negative action of the springs, as stated by Mr. Roe, and that its construction admitted of quick coupling and uncoupling; further, that the holding power of the coupling, if made of the requisite strength, was very great, and that each carriage is calculated for so as to meet the work that it is necessary to do. The great loss of life occasioned by the present coupling when a carriage leaves the line is in consequence of its dragging the rest of the train with it, which is, by this coupling, obviated, for as soon as the carriage tilts up it disengages, and, therefore, does not drag the other carriages off the line, and it should be kept in mind that the surface of the sliding faces of the coupling is made about seven inches square, so that the jumping of a carriage, which before it leaves the line is never less than two to three inches, would not disengage the coupling.

The CHAIRMAN said that all would agree with him that this was a most ingenious invention, and he would therefore propose a vote of thanks to the reader of the paper.

Mr. GADD stated that he was not the inventor, but the inventor, Mr. Green, was himself present.

Mr. CAMPIN (the Secretary) then suggested that, in accordance with the practice of the Institute, Mr. Green's name be coupled with Mr. Gadd's in the vote of thanks.

The CHAIRMAN moved a vote of thanks to Mr. Gadd, and coupled Mr. Green's name with it. This was put to the meeting, and carried unanimously.

The SECRETARY then announced that the meetings appointed to be held in January next (1874), would take place on Thursday, the 8th, and Thursday, the 22nd; that on the 8th would be a conference of the Council and members on Patent Law Reform; the subject for consideration on the 22nd would be duly found announced in the Journal.

After a vote of thanks to the Chairman, the meeting dissolved.

At the meeting of Council, held on January 8th, 1874, the minutes of the last meeting were read and confirmed as being correctly entered.

A proposition was made for retaining a book-keeper. This was referred to the Secretary to report further thereon.

Mr. CAMPIN (Secretary) represented that communications had been made from certain gentlemen who formed the joint committee of members of the Inventors' Institute and members of working class organisations in regard to laying the case of Patent Law Amendment before Mr. Gladstone (the Prime Minister) by deputation.

It was resolved that the Secretary be authorised to take measures to get Mr. Gladstone to receive such a deputation, and immediately communicate with the Council thereon.

The following gentlemen, admitted members of the Institute, were ordered to be placed on the list of members—viz., Messrs. Alfred Tucker, James Harrison, and W. H. Moore.

At the meeting of Council, held on January 22nd, 1874,

The Secretary reported that he had taken steps to retain a book-keeper in accordance with resolution of last meeting. He also reported that application had been made to the Prime Minister (Mr. Gladstone) to receive a deputation on the Patent Laws, and was now in correspondence with him on the subject.

Mr. Cromwell Varley was elected a member of the Council.

The following gentlemen having been admitted as, were ordered to be placed on the list of, members of the Inventors' Institute —viz., Messrs. F. Faulkner, E. Moriarty, J. Libert, F. Weldon, S. Howard, B. Cockayne, J. Lancaster, H. Walters, G. Webb, J. A. McKee.

Prof. Raymond, President of the American Institute of Mining Engineers, wishes it to be generally known that preparations have been already commenced for holding an International Exhibition at Philadelphia, in 1876. The Institute invites the "Iron and Steel Institute" of this country to visit America at that time, and extends invitation to the scientific societies of Europe generally.

MANCHESTER SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.—It has been announced that this promising institution, recently noticed in our columns, would, at the end of January, or the beginning of February, hold an exhibition in Peel Park, Manchester, of appliances for the saving of fuel. This exhibition is to be divided into eight sections: these embrace the getting of coal, coal-cuttting machinery and the like, the combustion of coal in furnaces and the production of steam, domestic fire-places, and all appliances for warming or ventilation.

At the meeting of the French Academy on January 12th, M. Le Verrier announced the completion of his tables of the planet Jupiter, which, he remarked, perfectly represented his motions from the epoch of the Greenwich observations in 1750 to the present time. There would appear therefore to be no other disturbing cause acting upon Jupiter sufficient to produce any effect appreciable by observation, besides those of the known bodies of the solar system. The perturbing effect of the large group of minor planets was found to be quite insensible. By the formation of these tables, M. Le Verrier has earned a new debt of gratitude from astronomers, who already owe to him the possession of Tables which have superseded all others for the computation of the places of Mercury, Venus, the Earth (or Sun) and Mars, in their respective orbits. It will be in the recollection of many that the Royal Astronomical Society of London marked their sense of the value of these by the award of their gold medal in February 1868.

Proceedings of Societies.

ROYAL SOCIETY.

December 11th.—Dr. Hooker, C.B., President in the chair. The following papers were read:—"A Quantitative Investigation of certain Relations between the Gaseous, the Liquid, and the Solid States of Water Substance," by Professor J Thomson; "On the Action of Heat on Gravitating Masses," by Mr. W. Crookes; "On the Male and the Structure of *Thaumops pellucida*," by Mr. R. von Willemöes-Suhm; and "On the Action of the Ribs in forced Breathing," by Dr. Ransome.

January 8th.—The President in the chair. —Papers were read by Mr. M. Simpson "On the Brom-Iodides;" by Dr. Stenhouse "On Orcins;" by Prof. Cayley "On the Transformation of Elliptic Functions;" and by Mr. G. Gore "On Electro Torsion."

January 15th.—The President in the chair. —The following paper was read: "Preliminary Account of an Investigation on the Transmission of Sound by the Atmosphere," by Dr. Tyndall.

GEOLOGICAL SOCIETY.

December 17th.—Professor Ramsay, V.P., in the chair.—Messrs. W. T. Loveday, N. Griffith, F. D. Godman, E. T. Newton, T. W. Hilton, and the Rev. C. R. Gordon, were elected Fellows. The following communications were read: "Observations on some Features in the Physical Geology of the Outer Himalayan Region of the Upper Punjab, India," by Mr. A. B. Wynne; and "On the Mode of Occurrence of Diamonds in South Africa," by Mr. E. J. Dunn.

MATHEMATICAL SOCIETY.

December 11th.—Professor Cayley, V.P., in the chair. Messrs. H. Lamb, R. R. Webb, and the Rev. M. M‘Wilkinson, were elected members, and Messrs. E. J. Lambert and R. F. Scott were proposed for election. Professor Clifford gave an account of his paper "On the Graphic Representation of the Harmonic Components of a Periodic Motion." Professor Cayley spoke on the subject of Steiner's Surface, and exhibited a diagram of it. Lord Rayleigh, Mr. Roberts, and Professor Cayley made short communications to the society.

January 8th.—Dr. Hurst, President in the chair.—Messrs. Lambert and R. F. Scott were elected Members; and the Revs. Dr. Booth, W. H. Laverty, and Mr. W. J. C. Miller, were proposed for election.—The following communications were made: "On the Transformation of Continued Products into Continued Fractions," by Mr. J. W. L. Glaisher; "The Foundations of the Differential Calculus and of Dynamics," by Prof. Clifford; "Method of Treating the Kinematical Question of the most General Displacement of a Solid in Space," by Prof. Crofton; and "Link Trammels," by Mr. Perigal.—The following were taken as read: "On Hamilton's Characteristic Function for a Narrow Beam of Light," by Prof. J. Clerk-Maxwell; and "Preliminary Account of Investigations on the Free Motion of a Solid in Elliptic Space," by Prof. Clifford.

ANTHROPOLOGICAL INSTITUTE.

December 30th.—Prof. Busk, President, in the chair.—Mr. I. Abrahams was elected a Member.—The following paper was read: "Ethnological Data from the Annals of the Elder Han," Part I., translated by Mr. A. Wylie, of Shanghai, with an introduction by Mr. H. H. Howorth. The Imperial Chinese annals of the various dynasties, which are as yet almost untouched, are distinguished by the extreme accuracy of their details, and in them is to be found a minute account of the intercourse of China with its neighbours reaching back in contemporary annals to at least the second century B.C. The series of Chinese annals begins properly with those of the Han dynasty, which reigned from about 202 B.C. to about 220 A.D. That was the golden prime of Chinese history, when the empire reached its furthest limits, when Buddhism was introduced, and when a great literature flourished. During the dynasty of Cheou, the old Imperial unity had been invaded by creation of various feudatories, who became almost independent. It was the aim of the immediate predecessors of the Han dynasty to destroy those feudatories, and to restore the unity of the Empire; and to effect that purpose, all the ancient books and histories were ordered to be burnt. The annals in the present communication contained an account of the numerous conquests from the date of the Elder Han, and embrace the history and migration of a large portion of the peoples of central and eastern Asia.—Mr. H. H. Howorth communicated the twelfth and concluding paper "On the Westerly Drifting Nomades: The Huns."

ZOOLOGICAL SOCIETY OF LONDON.

November 18th.—Dr. A. Günther, V.P., in the chair.—Mr. Sclater pointed out the characters of two new species of birds obtained in the State of Antioquia, Columbia, and named *Chlorochrysa nitidissima* and *Grallaria ruficeps*. A letter was read from Mr. R. Swinhoe, on the White Stork of China, and stating that he had recently obtained a live Pitta in China, which appeared to be *Pitta nympha* of the Fauna Japonica. Mr. A. H. Garrod pointed out certain peculiarities in the cæcum of the Crab-eating Fox (*Canis cancrivorus*). Mr. J. E. Harting made remarks on a curious variety of the Common Partridge shot in Northumberland. Mr. Sclater made remarks on a pair of horns of the new Bubaline Antelope from the Bogos country, lately named *Alcelaphus tora* by Dr. Gray. Letters and papers were read: from Dr. J. E. Gray, containing a paper by Dr. E. L. Moss, on a singular Virgularian Actinozoon taken at Burrard's Inlet, close to the Northern Mouth of the Frazer River; from Dr. O. Finch, on a new Passerine Bird which he had received from Mr. T. Klinesmith. of Levuka, Ovalou, Feejee Islands; this little bird, which was not only new as a species, but also the type of a new genus, he proposed to call *Lamprolia Victoriæ*; from Mr. W. S. Atkinson, on two new specimens of Butterflies from the Andaman Islands, which were named respectively *Papilio Mayo* and *Euplæa Andamanensis*: by Dr. Cobbold, being the first series of papers, entitled "Notes on the Entozo," being observations based on the examination of specimens contributed at intervals by Messrs. C. Darwin, R Swinhoe, C. W. Devis, and others; by Mr. E. Ward, on a new bird of Paradise, of the genus Epimachus, which he proposed to call *E. Ellioti*; from Surgeon-Major F. Day, on Indian Fishes, mostly copied from the original manuscripts of the late Dr. Hamilton Buchanan; by Mr. J. W. Clark, on the Eared Seals of the Auckland Islands, one of which he recognised as *Otaric Hookeri*, thus fixing the locality of this species.

January 6th, 1874.—Dr. A Günther, F.R S., Vice-President, in the chair. The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of December, 1873, and called special attention to a female onager, or wild ass, presented to the society by Capt. Henry Lowther Nutt, and a pair of the new Japanese storks (*Ciconia boyciana*), brought home by Mr. R. Swinhoe, and presented to the society by Mr. R. H. Boyce, Chief of H. M. Office of Works at Shanghai. The Secretary also called the attention of the meeting to a pair of the spotted wild cat (*Felis torquata* of Jerdon), which had been presented to the society by Capt. J. J. Bradshaw, who had taken them as kittens in the Scinde Valley, Cashmere. Dr. A. Leith Adams exhibited and made remarks on the horns of a feral race of *Capra hircus*, from the Old Head of Kinsale. The horns were very remarkable for their large size and very close resemblance to those of *Capra ægagrus*. Mr. P. L. Sclater, F.R.S., read a synopsis on the species of the genus *Synallaxis*, of the family *Dendrocolaptidæ*. The specimens of this difficult group in nearly all the principal collections of Europe and America had been examined, and the existence of 58 species ascertained, besides three of which the types were not accessible, and which were considered to be doubtful. Mr. George Busk, F.R.S., read a paper on a New British Polyzoon, proposed to be called *Hippuria egertoni*, after Sir Philip Egerton, who had discovered it growing upon the carapace of a specimen of *Gonoplax angulatus*, dredged up at Berehaven in the course of last summer. Mr Alfred Sanders, F.Z.S., read a series of notes on the myology of *Phrynosoma coronatum*. A communication was read from Dr. J. E. Gray, F.R.S., containing a description of the Steppe-cat of Bokhara, which he proposed to designate *Chaus caudatus*. Sir Victor Brooke, F.R S., read a paper on Sclater's Muntjac and other species of the genus *Cervulus*. In pointing out the distinctions which characterize the three existing species, *Cervulus muntjac*, *C. sclateri* and *C. reevesii*, the auther showed *C. sclateri*, the species of most northern range, to be intermediate in specific characters and size between the two others. Sir Victor pointed out an advance in the specialization of the tarsus of *Cervulus* not hitherto observed. In this genus the navicular, cuboid and second and third cuneiform bones were anchylosed together and formed one single bone, the first cuneiform being represented by a very small and separate bone. A second paper by Sir Victor Brooke contained the description of a new species of deer from Persia, a pair of horns of which he had received from Major Jones, H.B.M. Consul at Tabreez in Persia, and which he proposed to call *Cervus mesopotamicus*. Major H. H. Goodwin Austin read a paper on some birds, obtained by him in 1872-73 along the main water shed of the Brahmaputra and Irrawaddy Rivers. Of these ten were considered as new to science, viz.:—*Sitta Nagensis*, *Garrulax galbanus*, *G. albosuperciliaris*, *Trochalopteron cineraceum*, *T., virgatum*, *Actinodura waldeni*, *Layardia robiginosa*, *Prinia rufula*, *Cisticola munipurensis*, *Munia subundulata*. Mr. Garrod made some remarks upon the morbid symptoms presented by the Indian rhinoceros that had lately died in the Society's gardens, and upon certain points in its anatomy. Mr. Edwyn C. Reed communicated a paper on the Chilian species of the Coleopterous families *Cicindelidæ* and *Carabidæ*.

January 20th, 1874.—Professor Newton, F.R.S., Vice-President, in the chair.—Mr. Sclater exhibited two skulls of Baird's tapir (*Tapirus bairdi*) received from Mr. Constantine Rickards, of Oaxaca, Mexico. The receipt of these specimens proved that this tapir extended from Panama through Central America into Southern Mexico and was probably the only species of this genus to be met with in America, North of the Panamanic Isthmus. Mr. Sclater also exhibited and made remarks on skulls of *Ovis arkar*, from the Altai Mountains, and the stuffed skin of a specimen of the wild ibex of Crete. Mr. E. Ward exhibited two feet of a fawn, the mother of which had had double hind feet, and had for several years brought forth fawns having the same malformation. A communication was read from Dr. O. Finsch containing the description of an apparently new species of parrot from Western Peru, which was proposed to be called *Psittacula andicola*. A second paper by Dr. Finsch contained the description of a new species of fruit pigeon from the Pacific

Island of Rapa or Opara. This unique specimen had been sent to the author by Mr. F. W. Hutton, of Otago, New Zealand, after whom it was proposed to name the bird *Ptilonopus huttoni*. A note was read by Major O. B. C. St. John, F.Z.S., on the locality of the Beatrix antelope (*Oryx beatrix*), which was believed to be the South of Muscat. Mr. Edward R. Alston read the description of a new bat of the genus *Pteropus*, which had been sent to him from Samoa for identification by the Rev. S. J. Whitmee. Mr. Alston proposed to call this species *Pteropus Whitmeei*. A communication was read from Mr. A. G. Butler, containing a list of the species of *Fulgora*, with descriptions of three new species in the collection of the British Museum. A communication was read from Mr. Herbert Druce, F.Z.S., containing an account of the Lepidopterous insects collected by Mr. E. Layard, at Chentaboon and Mahconchaisee, Siam, with descriptions of new species.

MICROSCOPICAL SOCIETY.

JANUARY 3RD —C. Brooke, Esq., President, in the chair.—Dr. A. Carpenter was elected a Fellow.—The names of gentlemen proposed for election as Officers and Council were read by the Secretary, and Mr. Jones and Mr. Suffolk were elected auditors.—A communication from Lord Osborne, offering to supply rotifers to Fellows who would apply to him, was read to the meeting.—Mr. C. Stewart gave a *résumé* of a paper contributed by Dr. H. D. Schmidt, of New Orleans, "On the Origin and Development of Red-Blood Corpuscles in the Human Embryo," and illustrated his remarks by black-board diagrams, enlarged from a number of drawings which accompanied the paper.—A discussion followed, in which Dr. Lawson, Dr. Matthews, Mr. Stewart, and the President took part.—A paper was read by Mr. A. Sanders, "On the Zoosperms of Crustacea and other Invertebrata."—Specimens of a simple method of preparing drawings of microscopic objects for class illustration were introduced to the notice of the meeting; and Mr. Richards exhibited a new arrangement for a tank microscope, for the examination of objects under water to a depth of eight inches.

VICTORIA (PHILOSOPHICAL) INSTITUTE.

THE first meeting of the ninth session took place recently, at the Society's House, 8, Adelphi-terrace. The election of forty-two new members was announced, making an increase to the strength of the Institute of upwards of one hundred members during the year.

Amongst those elected were Professor Hodge, LL.D. (U.S.), Canons J. B. M'Caul and Woodrooffe, the Rev. F. Garden (subdean), Dr. J. A. Hessey, and Rev. A. W. W. Steel (Caius); also, Messrs. F. A. Bevan, J. Bridge, E. Gosse, E. Howard, J. W. Lea, R. Trotter, W. M. Walters, and a large number of other laymen.

A paper on Buddhism was read by Bishop P. C. Claughton, at a rather crowded meeting of the Victoria (Philosophical) Institute, recently held at the House of the Society of Arts. The proceedings of the evening were commenced by announcing the election of several new members, after which letters of apology were read from the Bishops of St. David's, Peterborough, Hereford, and others; and Professors E. H. Palmer, Bright, Westcott, Swainson, Max-Muller (from whom a communication was afterwards read), and others. Bishop Claughton commenced by considering Buddhism—which was rather a system of philosophy than a religion—as it existed in Ceylon in the present day; after which he proceeded to examine the theory of Buddhism as taught by its priests, and showed that, whilst it inculcated a system of morality, that system had no sufficient principle or motive; and although, as a system, it was not comparable to the Christian religion, yet all who had studied its recognised books would grant that it was the best outside that religion. He concluded by showing that the natural results of its teaching was to foster superstition. The discussion was commenced by the reading a letter from Professor Max-Muller, in which he stated that "judging Buddhism from its sacred books, he was not led to differ much from the Bishop in his estimate of it."

SOCIETY OF BIBLICAL ARCHÆOLOGY.

TUESDAY, Jan. 6TH.—Dr. Birch, K.R., F.S.A., F.R.S.L., President in the chair.—Sixteen members were elected.

The following papers were then read :—

1. The Sallier Papyrus containing the Wars of Rameses Meriamun with the Khita. Translated with annotations by Professor Lushington. This well known text was supplemented by a fragment from the Raifet collection; it contains perhaps the most vivid picture of a pre-Homeric battle extant; the king himself, the chief actor, frequently speaking in the first person The two finest passages, the prayer of Rameses to his father Amun, and the defeat of the Hittites, possessing peculiar beauty, in addition to the interest attaching itself to a people who about 1200 B.C. were formidable enemies to the Egyptians themselves. The value of the translation was enhanced by philological notes.

2. On some Illustrations of the Book of Daniel from the Assyrian Inscriptions. By H. Fox Talbot, F.R.S. In this paper the learned Assyriologist produced corroborative evidence of the extreme forms of punishment by a fiery furnace and the lion's den, as related by Daniel, from the annals of Assurbanipal, who states that having conqured his brother Saulmugina he executed him by throwing him into a burning fiery furnace, together with many of his adherents, about the seventh century B.C.

CHEMICAL SOCIETY.

JANUARY 15TH.—Professor Odling, President, in the chair. Mr. W. C. Roberts handed in a table, supplementary to his paper read at the last meeting, and containing complete analyses of all the Standard Trial Plates still extant, dating from A.D. 1477, namely, seventeen gold plates and fourteen silver ones.—The following papers were read: "On the Action of Trichloracetyl Chloride on Amines, I. Action on Aniline," by Dr. D. Tommasi and Mr. R. Meldola. This reaction gives rise to a substance called *phenyl-triacetamide*, which crystallizes in lustrous plates. It is acted on by nitric acid with production of *dinitrophenyl-triacetamide*, crystallizing in yellow needles,—"Note on the Action of Sodic Ethylate on Ethylic Oxalate and other Ethereal Salts," by Dr. H. E. Armstrong,—"On the Products of Decomposition of Castor Oil, I. Sebacic Acid," by Mr. E. Neison, giving an account of the preparation and properties of pure sebacic acid, and of many of its salts.

METEOROLOGICAL SOCIETY.

JANUARY 22ND.—Annual Meeting.—Dr. R. J. Mann, President, in the chair.—The Report of the Council dealt principally with the various alterations made at the Society's library at 30, Great George-street, and with the efforts which the Council have been making to extend the operations of the Society, and rest them upon a broader basis than heretofore. The Council took advantage of the presence of their Foreign Secretary, Mr. Scott, as one of the delegates from this country at the Meteorological Congress at Vienna, to request him to represent the Society. The Congress was duly held from the 1st to the 16th September, when Mr. Scott presented a paper on the replies received in answer to a series of questions which the Council issued to the Fellows on several points in connection with the hours of observation, instruments, &c., and which has been printed in the Report of the Congress.—The President then delivered his address.—The following gentlemen were elected officers and council for the ensuing year: President, R. J. Mann; Vice-Presidents, C. Brooke, G. Dines, H. S. Eaton, Lieut.-col. A. Strange; Treasurer, H. Perigal; Trustees, Sir A. Brady, S. W. Silver; Secretaries, G. J. Symons and J. W. Tripe; Foreign Secretary, R. H. Scott; Council, P. Bicknell, A. Brewin, C. O. F. Cator, R. Field, F. Gaster, J. K. Laughton, R. J. Lechy, W. C. Nash, Rev. S. J. Perry, Capt. H. Toynbee, C. V. Walker, and E. O. W. Whithouse.

THE INSTITUTION OF CIVIL ENGINEERS.

AT the meeting of this society on Tuesday, the 2nd of December, Mr. Hawksley, President, in the chair, forty-nine candidates were balloted for and declared to be duly elected, including four members—viz., Mr. Henry Thomas Geoghegan, Ex. Eng., P. W. D., India; Mr. Perceval Moses Parsons, Blackheath; Mr. Cyril James Shaw, Chief Engineer, Carwar State Railway Surveys; and Mr. Benjamin Walker, Leeds. Forty five gentlemen were elected associates—viz., Mr. Thomas Airey, Dantzig; Mr. Edward Robert Austin, Strand; Mr. Edmund Scott Barber, Irrigation Office, Colombo; Mr. Hilary Bauerman, Brixton; Mr. Nathaniel St. Bernard Beardmore, Stud. Inst. C.E., Westminster; Mr. William Atkinson Bell, Assistant Engineer, P.W.D., India; Mr. John Brown, Assistant Engineer, Cape Government Railways; Mr. Robert Burton Buckley, Assistant Engineer, P.W.D., India; Mr. Gabriel Gordon Cleather, Kensington Gardens Square; Mr. William Ovenden Collard, Canterbury; Mr. George Cæsar Cooke, Ex. Eng., P.W.D., India; Mr. William Milner Crowe, Westminster; Mr. Cyril West Darley, Resident Engineer of the Newcastle Harbour Works, N.S.W.; Mr. Charles Elwin, Stud. Inst. C.E., Pimlico; Mr. James John Alexander Flower, Cape Town; Mr. James Fraser, Inverness; Mr. Walter Faithfull Garland, Stud. Inst. C.E., Venezuela; Mr. John Cameron Graham, Greenwich; Major Irwin Montgomery Greig, R.E., Ex. Eng., P.W.D., India; Mr. Henry Woolcroft Hammond, Southampton Buildings; the Hon. Arthur Wyndham Holmes à Court, Surveyor of Public Works to the Government of Antigua; Mr. Osbert Henry Howarth, Stud. Inst. C.E., Westminster; Mr. Arthur John Hughes, Assistant Chief Engineer and Assistant Secretary to the Government of Bengal in the Public Works Department; Mr. Samuel Hunter, Engineer and Manager of the Rochdale Corporation Gas Works; Mr. Charles Henry Grey Jenkinson, Stud. Inst. C.E., Assistant Engineer P.W.D., India; Thomas Lewis Johnson, Borough Surveyor, Barnsley; Mr. Edward Henry Keating, City Engineer, Halifax, N.S.; Mr. William Hubert Kinch, Stud. Inst. C.E., Darlington; Mr. Frank Howard Landon, Stud. Inst. C.E., Assistant Engineer, P.W.D., India; Mr. Charles Lean, jun., Westminster; Mr. Albert Lewis Newdigate, M.A., Harbour Improvement Works, Dover; Mr. William John Adamson Parker, Sheffield; Mr. Manual Hipolito Pena, Engineer to the State of Cundiramarca, United States of Colombia; Mr. Alphonso Raymond, Stud. Inst. C.E., G. W. Ry., Oxford; Mr. Henry Strutt Collette Ree, Beverwijk, Holland; Mr. Charles Remfry, Linares, Spain; Mr. John Kirby Rodwell, Stud. Inst. C.E., Las Miuars, Spain; Mr. Aloys Sprenger, Ex. Eng., P.W.D., India; Mr. John Somes Storey, Resident Engineer on the Settle and Carlisle Railway; Mr. Frederick Toplis, Stud. Inst. C.E., Doncaster; Mr. Ralph Hart Tweddell, Westminster; Mr. Nowrosjee Nesserwanjee Wadia, Bombay; Mr.

David Wallace, Assistant Engineer, P.W.D., India; and Major David Ward, R.E., Ex. Eng., P.W.D., India.

The Council reported that, acting under the powers of the Bye-Laws, they had recently transferred Messrs. Henry Brady and James Samuel Cooke from the class of Associate to that of member; and had admitted the following candidates as Students of the Institution: Messrs. George Procter Carless, Adolphus James Chancellor, Gerard Cowper, George Lacy Good, Willoughby Rochester Hughes, Alfred William Lawford, Herbert Neal, Robert Charles Frederick Ogilvie, Edward Hermann Pargiter, Edward Robins, and John William Randell, and Sir Thomas Raikes Thompson, Bart.

The newly-elected President, Mr. Thomas Elliot Harrison, delivered an inaugural address on Tuesday evening, the 13th of January, 1874, on taking the chair for the first time since his election. After giving an account of the progress made in various branches of engineering of late years, he spoke at considerable length on the subject of railways and their management, a subject with which he is eminently familiar, being the Engineer-in-chief of the North Eastern Railway, and having been for many years connected with the working as well as the making of railways. Mr. Harrison characterised as ungenerous and unjust the custom of newspaper writers to assert that railway directors and railway managers and officials had no feeling, and that they looked to a saving of expenditure in preference to seeking provisions for the public safety. He believed the public had no idea of the anxieties which attached to those connected with railway management. He had seen directors completely overcome on receiving the report of a railway accident; and, from a few years' experience as a railway manager, nothing would have induced him to continue in office. These gentlemen ought to receive the greatest sympathy, for he could name men whose early deaths or permanent ill-health might be traced to the laborious work they had had to undergo in the service of the public, and to the constant anxieties incident on their duties. So far from economy governing the actions of directors, he could state from personal experience that when it was clearly shown to them, by their responsible officers, that any improvement would tend to promote the public safety, they did not hesitate to adopt it. Mr. Harrison directed attention to the popular delusion that the various recommendations of the officers of the Board of Trade, such as the block system, interlocking of points, &c., were the inventions of those officers, the fact being that not one of those systems, or any new idea in connection with the working of railways, had ever been suggested by them. He had given a great deal of attention and anxious thought for many years to the subject of accidents, and attached much importance to the item of human fallibility. Accidents frequently occurred in the hands of the most experienced men in a moment of forgetfulness, which no mechanical contrivances could obviate. The very introduction of precautionary measures, such as the block system, would on this score increase the danger, by lessening the sense of responsibility of railway servants, who would not keep so strict a look-out as on an unprotected line. Mr. Harrison finally referred to the great increase in the cost of railway works—30 or 40 per cent. more than a few years ago arising from the state of the labour market. On the general question of the policy of railway companies towards the public he advocated great liberality, especially in giving increased facilities and accommodation, in the reduction of fares in populous districts, and in rendering every encouragement to parties able and willing to develop the industry of the country.

At the same meeting of this Society, Tuesday, Jan. 13th, twenty-one candidates were balloted for, and declared to be duly elected, viz.: Mr. William Smith, Resident Engineer, in charge of the Holyhead Division of the London and North Western Railway, as a Member; and Messrs. Arthur Turnour Atchison, M.A., Stud. Inst. C.E., Assistant Engineer Alexandra Dock Works, Newport, Mon.; Arthur Lloyd Cochrane Bamber, Stud. Inst. C.E, Metropolitan Board of Works; George Horatio Townsend Beamish, Stud. Inst. C.E., Cork; Walter Chapman Burder, Stud. Inst. C.E., Bishop's Stortford; Francis Coffee, Resident Engineer, Kilrush and Kilkee Railway; William Gordon Lynch Cotton, Assistant Secretary Buildings and Roads branch, P.W.D., India; Charles Edward Cowper, Stud. Inst. C.E., Westminster; Jacob Forrest, Managing Director of the Oak Pits Colliery Co., Mold; William Gill, late Poti-Tiflis Railway; John Ellard Gore, Assistant Engineer, P.W.D., India; Richard Fuge Grantham. Westminster; John Alfred Griffiths, Stud. Inst. C.E., Queensland; Richard Lionel Jones, B.A., Engineering Staff of the London, Chatham, and Dover Railway Co.; Robert Nuttall, Westminster; William Lancaster Owen, Chief Engineer to the Monmouthshire Railway and Canal Company; George James Perram, Stud. Inst. C.E., Assistant Engineer P.W.D., India; George Pothecary, Assistant Secretary to the Government of Bengal in P.W.D. of India; John Somerville, Engineer Dublin Gas Company; and Allen Anderson Whitehorn Kingston, Jamaica.

It was reported that the Council, acting under the provisions of the By-laws, had recently transferred Messrs. Frederick Collier Christy, George Frederick Deacon, John Lawton Haddan, George Albert Hutchins, Alexander Leslie, James Mansergh, Henry Prince, and William Vawdrey, from the class of Associates to that of Members; and had admitted the following candidates as Students of the Institution, viz.: Messrs John George Blackett, Clarence Arthur Cramer, George James Atchison Danford, Henry Evan Griffith Evans, John Coleman Fergusson, Charles MacIntyre Forbes, Thomas Percy Gunyon, John James Hatten, Arthur Cameron Hurtzig, John Pollard, Oswald Milton Prouse, Percy Thursby, Charles Henry Billinhurst Whitworth, and John Henry Williams.

January 20th.—T. E. Harrison, Esq., President, in the chair.—The paper read was "On the Mechanical Production of Cold," by Mr. A. C. Kirk.

ANTIQUARIAN SOCIETY.

JANUARY 15TH.—C. S. Perceval, Esq., LL.D., V.P., in the chair. Mr. M. H. Bloxham, exhibited a Charter granted by King John, A.D. 1209, to the nuns of Steynfield, Lincolnshire; a horn cup found in the well-plate of Lapworth Church, Warwickshire; and a drawing of a glass bottle found under the floor of the nave of the same church; and two leaden tokens found in the playground of Rugby School. Dr. C. Bruce communicated an account of discoveries recently made near the Roman Wall. During the construction of a new bridge over the Tyne, at Newcastle, the workmen came upon what Dr. Bruce believed to be the substructures of three bridges previously built over the Tyne—viz., (1) Hadrian's bridge, (2) a bridge built in the twelfth century, and (3) a bridge built in the eighteenth century. Of the two former bridges, Dr. Bruce exhibited portions of the timbers so found, as well as plans showing the positions in which they were found. Dr. Bruce also exhibited drawings and photographs of various iuscriptions and bas-reliefs which had recently been acquired through the zeal of Mr. Clayton.

Dr. Max Schultze, the anatomist, died at Bonn recently.

APPLICATIONS FOR LETTERS PATENT.

(*Continued from page* 14.)

On October 28th.—3492 to 3505.—W. Penro
Production or manufacture of coke.—R. F
man. Detergent powder for the cleaning
washing of paint work, varnished work, Fren
polished work of every description, also
paintings, without the use of either soap or a
alkali.—J. J. Martin. Apparatus used
hanging, cooling, and cutting up pigs.—F.
Warren. Mode and means or apparatus
condensing or reliquifying the vapours of et
or other volatile liquid employed to produ
cold refrigerating machines.—J. Imray. Ap
ratus for coupling and uncoupling railw
carriages (com.)—H. Walters and I. Re
Machine or apparatus for "pickling" plates
the manufacture of tin-plates and other ma
factures in metals.—L. Beesley, W. Beesl
and J. Beesley. Machinery for punching
shearing metals and cropping angle iron.
Lomax, G. F. Bradbury, T. Chadwick,
T. Singleton. Sewing machines.—W.
Wilkinson. Nails and spikes (com.)—
Walker, J. Walker, and S. Walker. Dir
acting steam engines for pumping and ot
purposes.—R. Owen. Obtaining a black
ment for paint by the utilization of a chemi
by-product or refuse, and for the machinery
apparatus connected therewith.—E. Sècl
Construction of harmoniums or similar mus
instruments with loose reeds, whereby
sounds or tones are produced.—S. T. Pomer
Finger-guard and rest for pens or pen-holde
—H. Y. D. Scott. Kilns for burning li
bricks, tiles, and other articles, and for
calcination of minerals.

On October 29th.—3506 to 3520.—C. T. Ow
Winding engines and apparatus for raising c
stone, materials, and other heavy bodies.—
C. Grant. Signals, having for their objec
prevent collisions at sea.—J. Laird, jun.,
W. Rutherford. Weaving bags, sacks,
other tubular and double fabrics, and
means employed therefor.—S. Bentley and
Mullard. Heat generator and coal economi
adapted for all purposes of domestic or other
where facilities for heating and cooking are
quired.—P. B. Eassie. Pile drivers.—
Dearnaley and W. J. Potter. Railway cha
—A. H. Colles. Apparatus for scoring the g
of billiards.—T. W. Sidgreaves. Sewing
chines.—J. C. Stevenson. Furnace, and me
and apparatus connected therewith, for cons
ing smoke and economising fuel.—R. B. Boyn
Rotary engines for using steam or other exp
sive fluids.—W. Plant. Apparatus for clipp
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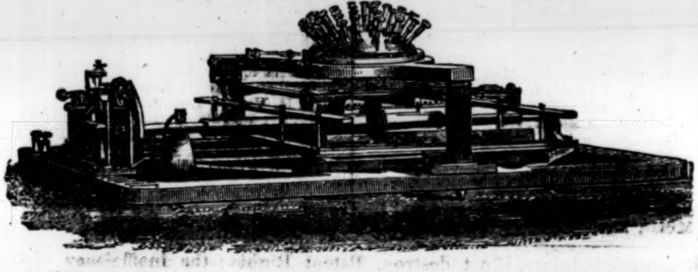

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